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Financing Standardization

PROPOSALS FOR IMPROVING THE B.S.I.'S POSITION

FIFTY years ago the British Standards Institution had its origin in the Engineering Standards Committee set up by the Institution of Civil Engineers. Since then the work of standardization has continued to expand in scope and volume and the half-century mark is a suitable point for the examination of the structure, operation and finance of the B.S.I.

We have already briefly recorded the results of such a study by the Cunliffe Committee appointed by the President of the Board of Trade and have noted the principal recommendations. This Committee was satisfied of the fitness for purpose of the present constitution and organization of the B.S.I., but not with the amount of the financial support which it receives, in view of the importance of its work and the possibilities of extending it.

Value of Institution's Work

While a few of the individual beneficiaries may have some idea of the actual saving accruing to them from standardization, there is no means of assessing the grand total of benefits which have resulted from the fifty years' work of the B.S.I. and its forerunners. By simplifying production and distribution, standardization has conserved time, energy and material to a vast extent, apart from providing guarantees of quality and suitability for the products of all branches of industry. Incidentally it has contributed largely to the expansion of our export trade, particularly that with the Dominions.

Firms' Contributions

If the work is to be extended, as is most desirable, it is fitting that those who benefit from it should give greater support. And as the benefit is general everybody should contribute. The Cunliffe Committee's report, which reinforces the recommendations of the Lemon Committee of 1949, deals in some detail with this aspect. It recognizes that the value of the B.S.I. to any individual firm is not easily assessed and it is left to the firm itself to act fairly and perhaps generously. It is suggested, however, that the minimum subscription should be raised from the present two guineas to five guineas.

The Committee is appreciative of the support given to the B.S.I. by trade associations, but it deprecates the idea that member firms should think that that absolves them from further liability. It looks to the boards of nationalized industries to set an example to private industry in the matter of subscriptions.

As standardization brings about substantial savings in production costs,

as well as a great increase in convenience, the public derives much advantage from it. The public generally is, of course, unaware of this but it has always been realized by the Government, on the public's behalf, and it has regularly contributed to the Institution's funds. The time has now arrived for even greater aid. At present the limit is £50,000 a year; the Committee considers that the Government grant in any one year should equal the amount subscribed by industry in the preceding year, up to a maximum of £150,000. This should enable the Institution to accumulate a reserve, to be used for special urgent work—at present the subject of separate appeals.

There is a third source of revenue—the sale of publications. It would be possible to raise prices but this is considered undesirable as being likely to restrict the dissemination of standards. But some subscribers receive publications of a greater value than their subscriptions and this should certainly be put right.

General appreciation of the value of standardization should ensure a general sympathetic response to the Cunliffe Committee's recommendations. This would be reinforced by making the valuable work of the B.S.I. more widely known—a subject upon which the Committee also makes suggestions.

FILM EDUCATION

Debarred by present-day circumstances from active propaganda, the Electrical Development Association has had to devote all its energies to the educational work which has always been an important phase of its activities. One potent method of inculcating a better knowledge of electricity, mainly in schoolchildren and students, has been the production of educational films which skilfully blend interest with instruction. There are now eighteen of these films and a further nine are coming along. The three latest, which we saw last week, deal with magnetism, water heating and light. In the first there are remarkable photo-micrographs showing the behaviour of magnetic substances—a veritable *tour de force*.

PIMLICO DISTRICT HEATING

The supply of heat to 2,800 flats in Westminster, which has now been started on a limited scale, is said to be the first example in this country of the use for district heating of the exhaust steam from back-pressure turbines in a public electricity generating station. Particulars of the scheme were given in our issue of 30th December, 1949. Conditions are favourable to success, but the exhaust steam is derived not from the main turbines at Battersea power station, as some daily papers have assumed, but from two 1,350 kW sets whose electrical output is used for driving the station auxiliaries. Together their output is only about 5 per cent of the designed capacity of the station and less than 10 per cent of the auxiliary power required.

APPLIANCE PRODUCTION

The production of domestic electrical appliances will be severely curtailed by the prohibition placed upon the use of copper and zinc for many purposes after 1st July next. In the United States it seems there will still be some copper and zinc available for domestic appliances, although the American rearmament programme is absorbing a tremendous proportion of the country's resources. The New York *Electrical World* refers to "a much broader range than was possible during all-out war." We gave reasons in our issue of 26th January for some relaxation of the ban on the use of metal for domestic appliances and still hope that this will be possible and that the ban will not have to be retained too long.

ENGINEERS AND MANAGEMENT

In the February *Electrical Power Engineer* the old question: "Should engineers manage?" is revived. It is recalled that whereas in the former municipal undertakings the engineer was practically always the manager also, in company undertakings the tendency was to separate the administrative and technical sides. Under nationalization, it is said, "the professional administrators have seen a new hope" and although "engineers are still fairly strongly placed in the referred scheme of things," on balance the administrators have made an advance. We hold, as we have often said before, that there are advantages in having engineers in managerial positions in the electricity supply industry. But we still believe that engineers must qualify themselves for management, a belief which the *Electrical Power Engineer* shares.

Draining the Fens

Gradual Change-over to Electric Pumping

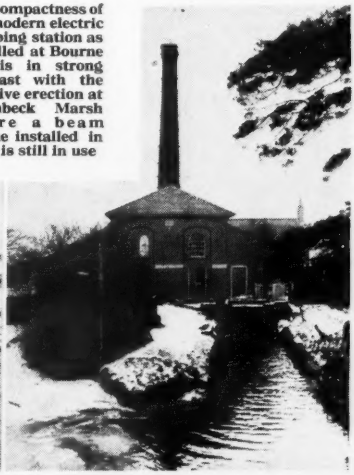
VIRTUALLY the whole of the East Anglian Fens would be rendered useless for agriculture, etc., if it were not for drainage. In some areas simple gravity drainage is sufficient but since most of the land is below sea level it has been necessary to resort to pumping. This reclamation of land by mechanical pumping methods has now been proceeding for nearly 150 years and there are now about 200 pumping stations keeping the low lying areas of the Fens free from water.

So gradual has been the development of the drainage systems and so well-made and long-lived the pumping plant that it is still possible to see in operation one of the original beam engines employed to drive water wheels and compare its cumbrousness with the modern compact fully-automatic electric pumping stations. One can also compare the relative merits of electrical plant with those of the oil engine installations which have been popular in recent years and see what it is that is influencing an increasing number of drainage authorities to change over to electricity when they can.

This conversion has become very much more marked during the past few years. Apart from the more general realization of its greater reliability, lower cost (especially for intermittent use) and automatic operation with virtually no attention required, the facilities offered by Electricity Boards for connection and supplies are in many cases better than they were before the nationalization of the electricity supply industry.

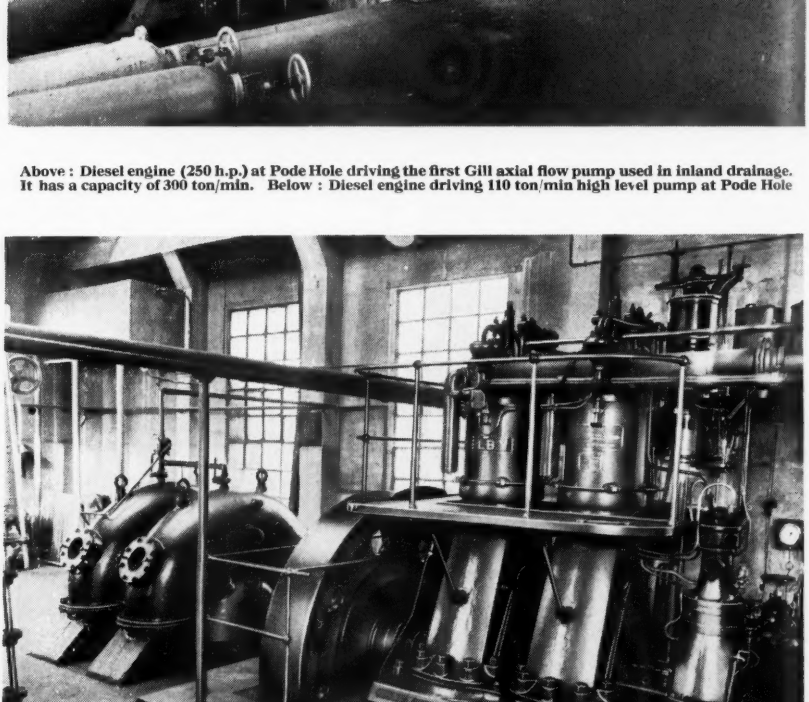
The 240 square miles covered by the South Holland Drainage Boards provide an excellent example of a typical scheme and in the area may be seen in operation equipment of all types from the very oldest to the most modern, plans well in hand also pointing the way to further developments. The methods employed and the general tendencies may be said to be similar to those to be found in the Fens as a whole.

Of the Boards' 240 square miles only about 70 sq miles requires to be pumped free of water, though small booster pumps are employed in a few localities to hasten the dispersal of the water collected by gravity in the remainder of the area. As will be seen from our map, the area pumped is covered by five schemes, each with its own pumping station, as follows: Deeping Fen and District (Pode Hole pumping station), Bourne Fen and Thurlby Fen (Bourne Fen), Pinchbeck Marsh, Fourth District, and Crowland and Cowbit Wash (Locks Mill station).



The compactness of the modern electric pumping station as installed at Bourne Fen is in strong contrast with the massive erection at Pinchbeck Marsh where a beam engine installed in 1833 is still in use

Above : Diesel engine (250 h.p.) at Pode Hole driving the first Gill axial flow pump used in inland drainage. It has a capacity of 300 ton/min. Below : Diesel engine driving 110 ton/min high level pump at Pode Hole

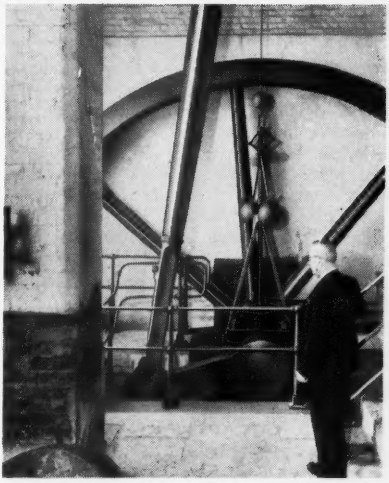


By far the largest pumping station is at Pode Hole which serves the original scheme covering the 30,000 acres of Deeping Fen and discharges the water collected into Vernott's drain. This station is over 125 years old and the original beam engine installed in 1825 is still to be seen there. Driving a 220 ton/min water wheel, this machine was of 80 h.p. and incorporated a 25ft diameter flywheel weighing 18 tons, and it required an engine room 42ft by 31ft by 40ft high, a boiler house with five 30ft by 8ft Lancashire boilers 55ft by 46ft by 30ft high, and an open coal yard 60ft by 38ft to carry 400 tons of coal. Following the usual practice of naming pumping plant, it was styled "The Holland." A second beam engine, "The Kesteven," a 70 h.p. machine embodying many improvements in the metalworker's art, replaced a less efficient engine fifty-five years later. Both machines remained in service until 1928.

In 1914, for high-level pumping, the first diesel engine driven pump was installed. "The Elloe," as it was called, comprises a Mirrlees, Bickerton & Day 100 h.p. two-cylinder engine direct coupled to a 36in twin centrifugal Francis bladed Gwynnes pump handling 100 tons a minute. "The Welby," a similar unit designed for variable-speed operation, came into use in 1921 and the two machines are now used only when flood conditions bring the water in the drain to a dangerously high level.

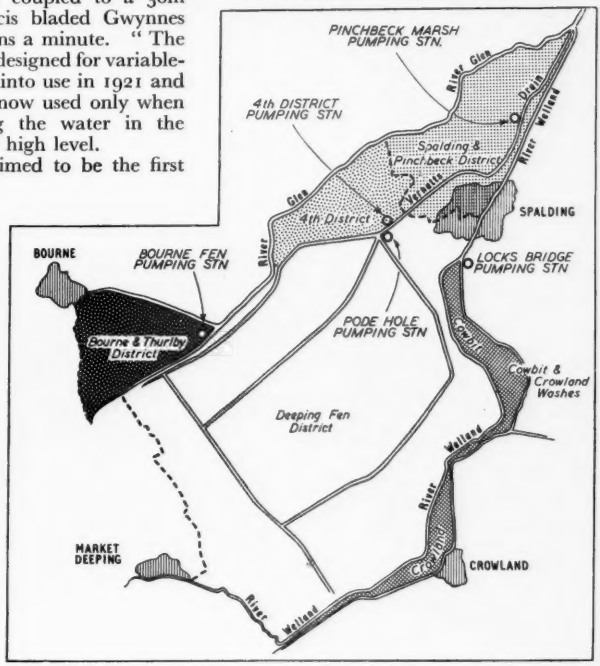
In 1928 what is claimed to be the first Vickers-Gill axial flow pump used for inland drainage was installed to replace the old beam engines. Named after Mr. William Dennis, at one time chairman of the Deeping Fen Drainage Board, this 300 ton/min 54in diameter pump is direct coupled to a Mirrlees 250 h.p. five-cylinder diesel engine with air-blast injection operating at 250 r.p.m.

The final development has been the adoption of electricity as the source of power, a similar Vickers Armstrong unit (named



This flywheel of the now superseded beam engine at Pode Hole is 26ft in diameter

The area served by the Deeping Fen, Spalding and Pinchbeck Internal Drainage Boards



after Mr. Henry Bain, engineer to the Drainage Board from 1904 to 1939) having been installed in 1939 driven by a 220 h.p. Metrovick motor. This set runs at 975 r.p.m. through a Moss reduction gear box at 236 r.p.m., rotor control of the motor being provided to give speed variation. The pump itself is practically the same as that used in the diesel installation except that it has four blades instead of five. An electrically driven exhauster pump (Nash Hytor) removes air from the pump and pipe line.

The electricity supply for the installation comes from the East Midlands Electricity Board, Spalding Sub-Area, at 11 kV and is stepped down to 400 V by means of a "Yorkshire" 250 kVA transformer. Metering is done on the h.v. side. A Statter isolating switch is employed for the h.v. supply, a Lucy & Co. switchboard being used for the l.v. control. B.I. power factor correction condensers have been provided. The transformer is also used to supply the local village and plans are in hand for the eventual completion of a ring main to serve it.

The remarkable compactness and neatness of the modern pumping station compared with the older buildings can be seen at Bourne South Fen. Officially opened in 1949 to pump into the River Glen, this is the most up-to-date of the Boards' plants. It serves an area of 3,300 acres and forms the general model, with minor improvements, for the other proposed new pumping stations to which we shall refer later. Though measuring only 24ft by 15ft by 19ft high, it accommodates two Hathorn Davey screw type mixed flow pumps of 20 cusec (7,500 gal/min) and 32 cusec (12,000 gal/min) capacity driven respectively by 62·5 h.p. 725 r.p.m. and 100 h.p. 575 r.p.m. Lancashire Dynamo & Crypto squirrel cage motors with Allen West direct-on-line starters. The sluice valves (Glenfield & Kennedy) are electrically operated. Bill switch fuses have been installed and the instrument panel includes Evershed & Vignoles recording ammeters and Landis & Gyr kWh and maximum demand meters. A solid distribution busbar chamber is employed, wiring being carried out exclusively in Pyrotenax mineral-insulated cable. The 400 V supply comes from an E.C.C. 150 kVA transformer with Long & Crawford h.v. switch connected to the 11 kV grid lines.

The temperature in the pump house may be raised with the aid of a G.E.C. 3 kW fan heater, under thermostatic control; other electrical equipment includes a 3 ton Vaughan overhead crane and a Smith clock. Besides the four reflectors (Benjamin) provided inside the station there are two units housing lamps over the intake to make it possible to see at night-time whether there are any weeds, ice, etc., obstructing the weed screens.

What is believed to be the only pumping station in the country still driven by a "Watt" type beam engine is to be seen at Pinchbeck Marsh. Installed in 1833 to serve an area of 4,000 acres and to discharge into the River Glen, it has a capacity of approximately 75 tons/min. It is driven by an 18ft by 6ft diameter Galloway boiler installed in 1893, and has a 19½ft diameter flywheel and a 22ft drum paddle wheel with forty-four 2ft 3in wide by 5ft 4in deep blades.

This installation is due to be replaced before the end of 1952 by a new pumping station constructed on the lines of that at Bourne Fen. It will be equipped with two Gwynnes axial flow pumps of 20 and 30 cusecs driven respectively by 45 h.p. 580 r.p.m. and 75 h.p. 725 r.p.m. English Electric three-phase 400 V squirrel cage motors with direct-on-line starting. The pumps, which are of 20in and 24in diameter, are to be equipped with Gwynnes patent siphon discharge basins with air brakes to eliminate the need for sluice valves, while the antivortices design of suction bearing will prevent air being sucked in.

With a floor area measuring only 15ft by 27ft, the new pumping station, which is required solely for winter operation, will accommodate, in addition to the pumps themselves, the 11 kV switchgear for the 200 kVA transformer on an adjoining site. Allen West air-break contactor type starters mounted with measuring instruments in a single totally enclosed panel, condensers to bring the power factor up to 0·95, Evershed & Vignoles "No-flote" equipment to switch off the pumps when the desired low level has been reached, ten 8ft thermostatically controlled tubular heaters and an electric clock. Pyrotenax cable has again been chosen for the wiring.

An identical new plant also to be completed by next year is also to be provided at the Fourth District pumping station which drains 3,000 acres into Vernott's

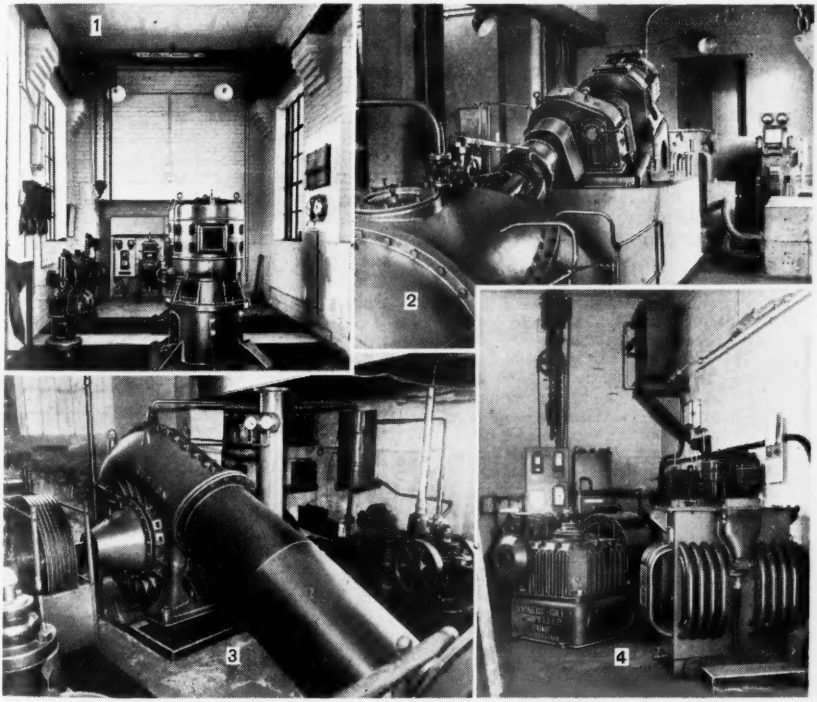
drain. At present the pumping equipment of this station comprises a 30 cusec Ruston pump driven by a diesel engine which was installed in 1942 to replace the gas engine which, in turn, took the place of a beam engine installed in 1829. A donkey engine is used for priming.

The 11 kV switchgear and 200 kVA transformers for the two new pumping stations referred to above will be supplied and installed by the East Midlands Electricity Board, Spalding Sub-Area, which also has in hand plans for a ring main scheme to serve both stations.

The fifth and last pumping station, Locks Mill, was completed in 1939 to control the water level in the 2,200 acres of Crowland and Cowbit Wash and discharge the surplus into the River Welland. It is designed for semi-automatic operation and normally unattended. Starting of the Vickers-Gill 38in vertical axial flow pump is carried out manually but it is stopped automatically by Evershed & Vignoles " No-flote " control. The pump is driven through David Brown " Radicon " worm reduction gear by means of a Laurence, Scott 100 h.p. 983 r.p.m. motor (with Ellison starter) supplied from a Hackbridge 11 kV/400 V 100 kVA transformer. A 15 kVA Hackbridge transformer mounted on the wall provides the 230 V supply for lighting, heating, etc. The switchgear and power factor meter were supplied by Switchgear & Cowans, Ltd., the kWh and maximum demand meters being of Metrovick make. A Venner time switch limits the operation of the station to off-peak periods.

We thank Mr. E. G. Taverner, chief engineer to the South Holland Land Drainage Boards, and his assistants for their help in preparing this article.

(1) Interior of Bourne Fen pumping station showing neat layout. (2) Example of a large electrically driven Gill axial flow pump, a 220 h.p. 300 ton/hr unit installed at Pode Hole. (3) This diesel driven pump at Fourth District is shortly to be supplanted by a modern electrical installation. (4) Locks Mill pumping station showing Vickers-Gill propeller pump, transformers and switchgear



Insulating Oil

Revised Specification for Transformer and Switchgear Type

By W. R. STOKER, B.SC.(ENG.), A.M.I.E.E., A.F.INST.PET.
(Shell Petroleum Co., Ltd.)

THERE has recently been issued a revised specification for insulating oil*. Until the present general revision this specification had remained unaltered since 1933, except for two minor amendments and an addendum. In the intervening years generally accepted views about properties that are desirable in insulating oils have been modified in the light of operating experience and methods of testing oil have been improved. The new specification takes account of these changes.

The phrase " low viscosity type " in the title of the revised specification is intended to distinguish transformer oil from the more viscous oils that are sometimes used in parts of switchgear and in certain instrument transformers. This specification is not intended to apply to oils for capacitors or cables.

Principal Changes

The main requirements of the new and old specifications are compared in Table I; the principal changes are:—

(1) Only one oil is now specified; the former Class A and oils with cold tests of 0 deg C and minus 10 deg C have been deleted.
(2) A limit for acidity development on oxidation has been introduced.
(3) The procedure for making the oxidation test has been slightly modified and, as a result, the sludge limit now specified is higher than that formerly stipulated for Class B oils.
(4) The minimum electric strength has been increased for deliveries in bulk.
(5) The use of inhibited oil is permitted with a particular provision.

The remaining changes are mainly concerned with test methods.

A major change in the specification relates to the classification of oils based on the results of the oxidation stability test. To make this test a 100 g sample of the oil, contained in a flask, is exposed under carefully controlled conditions to a temperature of 150 deg C for 45 hours in the presence of copper while air is blown through the oil. A water cooled condenser is fitted over the flask to assist the retention of volatile oxidation products. After oxidation, the sludge that has formed in the oil is weighed and expressed as a percentage of the weight of the oil. According to the new specification, the acidity that has formed is also determined.

The aim is to assess, from the behaviour of the oil in this short-time test, its probable behaviour during long periods of service. In the old specification the oil was designated Class A if the sludge was below 0·1 per cent (wt) and Class B if below 0·8 per cent (wt). Class A oils were intended for use when the operating conditions were more severe than could be met by Class B oils.

It was pointed out by B. Anderson, in the *ASEA Journal* in 1935, that B.S.148 Class B oil is of greater oxidation stability than Class A oil. He showed that not only is more acidity formed in Class A oil than in Class B during the B.S.I. oxidation test, but that its use in transformers leads to more acidity and sludge formation and greater decrease of the mechanical strength of cellulose insulation.

Acid-forming Tendencies

Operating experience with Class A oil before the war confirmed that it was more acid-forming than Class B; a most objectionable consequence was corrosion of metal parts of transformers above oil level, particularly tank lids. The use of Class A oils was consequently diminishing in favour of Class B. Since 1939 only Class B transformer oils have been produced in this country. However, even they vary in acid-

*B.S.148: 1951—Insulating Oil (Low Viscosity Type) for Transformers and Switchgear—British Standards Institution, 24, Victoria Street, London, S.W.1, price 6s post free.

orming tendencies, depending largely on the manner in which they are refined. The British Electrical and Allied Industries Research Association (E.R.A.) was investigating this matter before the war and its work is summarized in a paper by Gossling & Michie (*Journal Inst. Pet.*, pp. 356–364, No. 271 V 32, July, 1946). It was largely on the basis of this work that the B.S.I. committee introduced the limit of acidity after oxidation into the new specification, as a result of which oils that are liable to be unsatisfactory are excluded.

The introduction into the new specification of a limit to the formation of acidity, in addition to the sludge limit, undoubtedly improves it and brings it more into line with Continental practice. The Swedish (SEN.14), Swiss (SEV.124), German (VDE.0370 and Baader test) and Italian (CEI.7) specifications all include some form of limit to the formation of acidity during oxidation.

Sludge Test Conditions

The apparent change in sludge value from 0·8 to 1·1 mg KOH/g results only from a change of test method. Because of the poor repeatability of the test the B.S.I. has attempted to minimize differences between the results of sludge determinations made at different times or places; these differences have always been much greater than the reproducibility of 15 per cent stated in the specification might lead one to suppose. It has been shown by Gossling & Romney (*Journal Inst. Pet.*, pp. 424–433, No. 271 V 32, July, 1946) that one factor affecting the amount of sludge formed is variation of the temperature of the cooling water in the condenser above the oxidation flask; in the new specification the permitted variation is altered from 15–20 deg C to 20±1 deg C. This change of test conditions causes an increase of the amount of sludge formed so the maximum permitted weight of sludge has been increased accordingly. No relaxation of the sludging tendency of the oil is intended.

In the new specification only oil with a pour point below minus 25 deg F (minus 31·1 deg C) is included; this value is sufficiently low for most purposes. It was found possible, without seriously restricting the supply of oil, to exclude oils of higher pour point, such as the former B.0 and B.10 classes. The Institute of Petroleum method of determining the pour point replaces the obsolete "cold test."

Electric Strength

The increase of the minimum electric strength from 30 kV to 40 kV for oil supplied in rail-cars or road wagons has been made to satisfy a demand that exists in this country. However, it has proved impracticable, at present, to increase the minimum electric strength of oil supplied in drums or containers of 40 gallons or less. When the quality and type of drums available can be improved the limit of 40 kV minimum may possibly be made to apply also to oil in drums. However, when drums are stored for a long time, particularly if the storage conditions are imperfect, it will probably remain difficult to prevent the very slight contamination that suffices to reduce the electric strength below an acceptable value. Indeed when oil is shipped to or through the tropics it is never possible to be certain that it will be dry on receipt and the only safe course is to dry the oil immediately before use.

During recent years considerable research work has been undertaken, principally by oil suppliers, with the object of developing

TABLE I.—Comparison of old and new Standard Specification requirements

Property	Units	B.S.148: 1951	B.S.148: 1933
Sludge after oxidation	% wt.	max 1·1	Class A, 0.1 Class B, 0.8
Acidity development after oxidation	mg KOH/g	max 2·5	—
Evaporation loss	% wt.	max 1·6	1·6
Flash point (P.M.)	deg F	min 295	(293)
	deg C	min (146·1)	145
Viscosity at 70 deg F	Centistokes	max 37	—
Viscosity at 60 deg F	secs Redwood I	max —	200
Pour point	deg F	max −25	—
Cold test	deg C	max —	Class 0, 0 Class 10, −10 Class 30, −30
Electric strength (in bulk)	kV	min 40	30
(in drums)	kV	min 30	30
Neutralization value—			
Inorganic	mg KOH/g	max nil	nil
Organic	mg KOH/g	max 0·05	0·2
Saponification value	mg KOH/g	max 1·0	1·0
Copper discoloration	—	— must pass	must pass
Crackle test	—	— must pass	must pass if called for

transformer oil of greatly improved oxidation stability. Inhibitors are substances which, when added to the oil in relatively small proportions, greatly prolong the phase in the service life of the oil which precedes the onset of deterioration. However, users of transformer oils have been concerned at the possibility that inhibitors might be added to oils of inherently poor stability and that inhibited oils of this kind might behave badly in service. This belief has found expression in the new clause of the specification in which it is stipulated that when it is agreed to supply an inhibited oil, the base oil from which the inhibited oil is prepared must itself meet the specification before the addition of inhibitor. This cautious policy is likely to prevail until operating experience with inhibited transformer oil is more extensive than at present.

The other changes in the specification are the result of standardizing and improving test methods. For instance the Institute of Petroleum method of determining the flash-point, adopted in the new specification, provides for the temperature being raised in steps of 5 deg F and this is why the minimum flash-point is now specified as 295 deg F (146·1 deg C) instead of the previous value of 145 deg C (293 deg F). The viscosity of 37 cs at 70 deg F is equivalent to 151 secs Redwood I at that temperature. This corresponds approximately to the former limit of 200 secs Redwood I max. at 15·5 deg C (60 deg F); an exact relationship between viscosities at the two temperatures cannot be stated because, of course, the viscosity/temperature relationship is not always the same.

The new specification is an improvement upon the old one and oil complying with it will be of similar quality to the best oil supplied against the old specification. The number of standard classes of oil has been cut down from six to one by excluding Class A oils and by eliminating B.0 and B.10 oils. Refiners in this country have for some time been working on the problem and the supplying of oil to the new specification should present no difficulty.

In order that suppliers and users alike may derive the greatest benefit from this work of standardization it is desirable that the inclusion of special requirements additional to those of the B.S.I. should be discontinued in the future.

Multiple Conductors

THE use of a number of conductors in replacement of the usual single conductor per phase for high voltage transmission possesses certain advantages. American investigators have shown that such a system has increased capacitance and decreased inductance compared with a single conductor of similar cross-sectional area and, because of its reduced reactance, may be rated at a higher current-carrying capacity. For two conductors per phase a 30 per cent increase in current-carrying capacity is obtained with a decrease in reactance of 20 per cent and also an increase of corona initiation voltage.

These figures were quoted by Mr. E. J. Holmes in the paper he recently presented to the London Students' Section of the Institution of Electrical Engineers. It reviewed the work done on this subject in Europe and America since such a system was first suggested by P. H. Thomas in 1909. The results obtained in Germany in the early part of the war were discussed; they showed that corona losses increased more slowly with voltage and were less dependent on weather conditions than for a single conductor of the same total cross-sectional area.

Since the war more experiments have been carried out. In America the conductor sizes and spacings for 500 kV lines are under investigation, while in France the possibility of replacing existing 220 kV double circuit three-phase lines by a single 400 kV circuit of three pairs of two conductors per phase is being considered in an experimental station at Chevilly. In Sweden lines using double conductors are already in operation at 220 kV and a 380 kV system is expected to be working this year. The use of multiple conductors reduces the reactance, but to obtain further reduction a series capacitor has been included in the 300 mile 220 kV Stadsforsen line. A similar capacitor designed for the 380 kV line is estimated to increase the line load from 375 MW to 495 MW.

In Great Britain work is proceeding on the construction of a 275 kV grid, which will use double conductors, the spacing of which will be determined by tests now being undertaken.

The author concluded by describing tests he himself had made on double conductors strung along the axis of a test cylinder. The variation of corona power loss was obtained, by a high voltage Schering bridge, for different wire sizes and spacing. The corona initiation voltage was measured by detecting on a cathode-ray oscillograph, with suitable 50 c/s filter, the random high frequency currents produced at the onset of corona.

PERSONAL and SOCIAL

News of Men and Women of the Industry

THE Minister of Fuel and Power announces further re-appointments of part-time members of Area Electricity Boards as follows:—

South Eastern.—Lt. Col. Sir Merrik Burrell, Bt., C.B.E., J.P., and Mr. W. J. Oswald, A.M.I.E.E.

Southern.—Mr. W. H. Lawson, C.B.E., B.A., F.C.A., and Lt. Col. E. L. Luce, D.S.O., T.D., J.P.

South Western.—Mr. A. N. Irens, M.I.E.E., A.F.R.Ae.S., Mr. G. H. Johnstone, O.B.E., D.L., and Councillor S. H. Payne, J.P.

Eastern.—Mr. W. Newcome-Baker, C.I.B.A.E.

East Midlands.—Alderman J. Minto, J.P.

Midlands.—Mr. C. R. Heathcock, F.C.I.S., Mr. J. McDowall, and Mr. G. B. Partridge.

South Wales.—Mr. L. Parsons.

Yorkshire.—Alderman J. H. Bingham, J.P., Mr. R. E. Crowe and Councillor H. Fairbotham, J.P.

North Eastern.—Col. E. G. Angus, C.B.E., M.C., T.D., D.L., and Alderman C. F. Sanderson, J.P.

North Western.—Mr. J. R. Potts, J.P., and Mr. E. J. Smith.

Mr. G. O. Pritchard, traffic manager to the British Thomson-Houston Co., Ltd., and a member of the B.E.A.M.A. Transport Committee, has been appointed to the Transport Users' Consultative Committee for the West Midland Area. Another member is **Mr. C. E. Jordan,** transport controller, T.I. (Group Services), Ltd.

Mr. E. W. Faithfull, A.M.I.E.E., has been appointed district commercial manager, Newport District, of the South Wales Electricity Board. Since vesting day he has occupied the position of district commercial officer, Aberystwyth District of the Merseyside & North Wales Electricity Board. Previously, from 1946, he was borough electrical engineer and manager of Aberystwyth, and from 1941 to 1946, he was power sales engineer at High Wycombe. Mr. Faithfull expects to take up his new appointment towards the end of March.

On 15th February a farewell dinner was given at the Savoy Hotel, London, to **Mr. W. B. Phillips,** chairman of the Pyrene Co., Ltd., on his return to the United States. Mr. Phillips has fulfilled important roles in the international field and in trade relations between the United States and this country. He has been appointed president and chief executive of the Pyrene Manufacturing Co. of America but he will retain the chairmanship of the British Pyrene organization. He has been president of the American Chamber of Commerce in London since 1943, from which office he is now retiring.

At the annual general meeting of the British Radio Equipment Manufacturers' Association on 23rd February, **Mr. P. H. Spagnoletti** was elected chairman in succession to **Mr. M. M. Macqueen,** who has been ill. **Mr. E. K. Balcombe** was elected vice-chairman.

Mr. William Kidd, M.I.E.E., M.I.Mech.E., generating engineer (construction), North Western Division, B.E.A., who retired on 31st January, was born at Newcastle-on-Tyne in 1885. After general education at Cambridge and technical education at Durham College of Science, Mr. Kidd was apprenticed to the North Eastern Marine Engineering Co., Wallsend, and subsequently became assistant to the works manager. He held appointments with the Yorkshire Brass and Copper Co., the Palmer Steel and Iron Co., and later joined the Manchester Electricity Department. He was chief construction engineer when the British Electricity Authority was formed and he was then appointed generation engineer (construction), North Western Division. Mr. Kidd designed the first major urban 33 kV transmission scheme, developed automatic voltage control for networks, and invented a system of remote control of substations, an example of which is in service at Manchester. His other work included the complete reconstruction of Stuart Street station, whereby 180,000 kW of generating plant was installed in the centre of an industrial area, having a coal supply direct by conveyor from Bradford Colliery, and the design of Carrington station. He was awarded the I.E.E. "Institution" Premium in 1934, and the

Mr. W. Kidd

"John Snell" Premium in 1945. He was chairman of the I.E.E. North Western Centre in 1944-5.

Mr. R. Crawford has joined the Mine Safety Appliances Co., Ltd., Glasgow, as general sales manager covering the whole of Britain and the Continent. Before accepting this position on 1st January, he was chief electrical engineer of the National Coal Board and at vesting date had been Deputy Chief Electrical Inspector of Mines. Mr. Crawford, who was born and educated in London, received his early mining training in the Yorkshire coalfield. He also attended the University of Sheffield. He is president this year of the Association of Mining Electrical and Mechanical Engineers and is well known internationally in mining circles for his work as technical secretary to the Reid Committee. He is a member of the Institution of Mining Engineers and an associate of the Institution of Electrical Engineers.

Mr. R. Crawford

To mark the 70th anniversary of the foundation of **Dorman & Smith, Ltd.**, a dinner-dance was held on 17th February at the Midland Hotel, Manchester. The toast of the company was proposed by Alderman F. Cowin, the Mayor of Salford, and Mr. T. Atherton (chairman of the company), in reply, reviewed the history of the company which he said was founded by Mr. J. S. Raworth in 1881, and about two years later Mr. C. M. Dorman and Mr. R. A. Smith joined the firm. Their first patented lampholder was designed in the early '80s. They devoted their energies to the field of ship wiring. They could not buy their fittings and switches so they designed and made the bulk of the gear they used. From ships the business extended to large buildings and country houses for which they designed and made the necessary switchgear and fuses. Mr. Smith was the first engineer to use porcelain as an insulator, going to the potteries himself to design the tools to produce the shapes he needed. After referring to some of the important installations carried out by the company, Mr. Atherton concluded with tributes to his predecessor, Mr. H. G. Baggs (now living in retirement) and others who had helped to build up the company's reputation.

Mr. H. Leaver, district engineer for the Burnley area of the North Western Electricity Board, has retired after thirty-eight years' service with the electricity undertaking. The Sub-Area and District staffs of the Electricity Board presented him with a wrist watch. Mr. Leaver joined the Burnley undertaking in 1912. Before vesting day he was deputy borough electrical engineer.

Mr. J. Palmer, who recently celebrated twenty-five years' service with the Mullard organization, officially retired on 31st January. Mr. Palmer was engaged in export business during the greater part of his career. Before the war he was actively concerned with all Mullard interests abroad, but as a result of post-war expansion of Mullard export business, he subsequently specialized on valves and electron tubes only. With the formation, on 1st May last, of Mullard Overseas Ltd., he took over complete control of the company's valve interests abroad. Recently a number of friends and colleagues attended a luncheon held in his honour. In the evening, there was a large gathering in the staff canteen at Century House, at which

At the anniversary dinner-dance of Dorman & Smith, Ltd. *Left to right:* **Messrs. R. Amberton (director), Ald. E. A. Hardy, M.P., B. L. Cooper (deputy chairman), Ald. F. Cowin, J.P. (Mayor of Salford), C. M. Nesbitt (director), T. Atherton (chairman) and M. L. Cooper (director).**

Captain S. R. Mullard, founder of the Mullard Co. presented Mr. Palmer with a number of gifts.

Mr. C. A. S. Attewill, well known as manager of the B.T.H. London district lamp and lighting stores, has retired after serving more than thirty years with the company. He joined B.T.H. in February, 1920, after demobilization following the 1914-18 war, later becoming manager of the Wenlock Road, London, stores. These premises were destroyed during an air raid in 1941, after which Mr. Attewill and his staff carried on from a temporary address in South Wimbledon until new and permanent premises were found in Fitzroy Road, N.W.1.

Mr. Attewill has been presented with an antique bookcase from members of the B.T.H. London area lamp and lighting department sales and stores staff, on whose behalf Mr. V. C. H. Creer (director, lamp and lighting sales) made the presentation.

Mr. J. C. Fairchild recently retired from the position of consumers' engineer, South West Fylde District, North Western Electricity Board. Before vesting day Mr. Fairchild was borough electrical engineer of Lytham St. Annes.

Mr. S. Gordon Anderson, managing director of S. Gordon Anderson, Ltd., Auckland, New Zealand, will arrive in England at the end of March. He will visit connections in this country and inquiries from makers of electrical equipment seeking representation in New Zealand will be welcomed. He can be communicated with c/o McDonald, Scales & Co., Ltd., 3, South Place, Moorgate, London, E.C.2.

The board of Powell Duffryn Carbon Products Ltd., announces that **Mr. A. W. Morrison** has been appointed a director of the company. Since joining Powell Duffryn Carbon Products Ltd., Mr. Morrison has been in charge of the Chemical Carbon Division at the Company's works at Hayes. He is shortly leaving for the United States in connection with the business of the company.

Mr. A. J. Catlin has been appointed manager of the Industrial Section of the Truvox Engineering Co., Ltd., primarily responsible for the sales of Truvox "OCO" floor polishing machines.

Following the recent retirement of **Mr. A. B. Gibbons** from the board of Nalder Bros. & Thompson, Ltd., **Mr. D. W. Nalder,** director, and a son of the original founder of the company, has been appointed secretary. **Messrs. A. R. Miller, F. E. Pomeroy** and **E. W. Semmens,** who all have over thirty-five years' service with the company, have been appointed directors, as from 14th February. **Mr. A. G. O'Neill,** M.I.E.E., continues as chairman and managing director.

Mr. E. G. Spearing has been appointed assistant sales manager of Brown Brothers, Ltd., and has taken up his duties at head office. **Mr. A. B. Henderson,** previously an Edinburgh representative, has been appointed assistant manager at Edinburgh in succession to Mr. Spearing, and **Mr. E. G. Dickson,** a Cardiff representative, has been appointed assistant manager at the Wolverhampton Branch.

Mr. J. Wilson, O.B.E., has resigned from the presidency of the Quebec Power Co. because of ill health. **Mr. R. J. Beaumont** has been appointed chairman of the board and **Mr. J. A. Fuller** president. **Messrs. E. D. Gray-Donald** and **P. S. Gregory** have been elected vice-presidents.

Mr. P. Adorian, M.I.E.E., M.Brit.I.R.E., A.F.R.Ae.S., assistant managing director of Broadcast Relay Service, Ltd., has been appointed chairman of Redifon, Ltd., in succession to **Sir Ronald Matthews.** Mr. Adorian joined the Rediffusion group in 1932, and has been largely responsible for the development of its manufacturing company, Redifon, Ltd. He is president of the British Institution of Radio Engineers.

Over 500 spectators packed the canteen of the works of the Telegraph Construction & Maintenance Co., Ltd., for the grand open tournament arranged by the **Telcon Amateur Boxing Club** on 22nd February. The club is in its second season and a varied programme of 15 evenly matched bouts provided some interesting and often brilliant boxing.

OBITUARY

Mr. R. A. Marples, a director of Asea Electric, Ltd., died in Barnet Hospital on 26th February aged eighty. Mr. Marples joined the company in 1915 as manager of the Motor Dept. and was appointed a director in 1917. He retired in 1938. Mr. Marples was mainly concerned with industrial applications, particularly printing press drives, etc.

Mr. H. Hawkins.—The death has occurred of Mr. Herbert Hawkins, managing director of Alexander Hawkins & Sons, Ltd., electrical engineers, Southwark. Mr. Hawkins, who was seventy-six, commenced work with his father in 1889 and became joint managing director in 1906.

Mr. C. R. St. John, who died on 5th February at the age of sixty-seven, had been connected with the electrical industry for many years. He was educated at the Manchester College of Technology and apprenticed to Cowans, Ltd. (now Switchgear & Cowans, Ltd.). After a period with Ferranti, Ltd., he

joined Johnson & Phillips, Ltd., and superintended the erection of large h.v. switchboards during the early days of the electrification of the L.C.C. tramways. Later he practised as a consultant and was responsible for establishing electricity undertakings at Horley (Surrey) and St. Mary's (Scilly Isles).

Mr. Fred Whitton, who has died at Kirkstall, Leeds, at the age of eighty-seven, was the founder of Fred Whitton and Sons, electrical engineers and contractors, Morris Lane, Leeds.

WILLS

Mr. F. Forrest, C.B.E., M.Inst.C.E., M.I.Mech.E., M.I.E.E., a part-time member of the South Western Electricity Board, and formerly for many years chief engineer and manager of the Birmingham Corporation Electric Supply Department, left £7,969 gross (£7,691 net).

Mr. Percy Good, C.B.E., M.I.E.E., director of the British Standards Institution and past president of the Institution of Electrical Engineers, left £17,676 gross (£16,247 net).

Mr. S. C. Bunn, M.I.Mech.E., M.I.E.E., F.Inst.F., assistant electrical engineer at the Lots Road generating station, London Transport Executive, since 1940, left £9,148 gross (£8,644 net).

Mr. W. H. Peters, O.B.E., M.I.E.E., assistant general manager of the Coventry group of works of the General Electric Co., Ltd., left £6,714 gross (£4,005 net).

Control Gear Productivity

Team's Recommendations Approved by Manufacturers

At an open meeting in London on Tuesday representatives of motor control gear and small air break switchgear manufacturers met members of the Productivity Team which visited America last year, under the auspices of the Anglo-American Council on Productivity, for the purpose of discussing with them their report and conclusions. This meeting was organized on behalf of the Team by the British Electrical and Allied Manufacturers' Association.

Mr. E. C. Holroyde (vice-chairman, Crompton Parkinson, Ltd.) presided and Mr. R. J. Walton (managing director, Electrical Apparatus Co., Ltd.), the leader of the Team, gave a brief review of the report and explained its salient points.

A general discussion ensued and those present approved the report, endorsed its recommendations, and commended them to all interested parties, with an undertaking to implement the recommendations so far as was within their power.

It was proposed that the attention of the British Electricity Authority should be drawn to the wider application of direct switched squirrel cage motors in America and that the Authority's help should be requested in promoting a similar condition in this country. The attention of the Institution of Electrical Engineers is to be drawn to the clear guidance afforded to installation engineers on the selection of cable sizes and cable protective devices by the National Electric Code approved by the American Standards Association and the implicit recognition therein of the circumstances arising from the use of direct switched squirrel cage motors.

Furthermore, the attention of the British Standards Institution is to be drawn to the following points:—That the American fuse specifications prescribing carrying capacity and maximum blowing times with specified currents facilitated the co-ordination of cable sizes and cable protective devices. The American systems of classifying motors under group letters according to locked rotor characteristics also facilitated similar co-ordination.

In the light of American practice the B.S.I. is to be asked to reconsider the test clauses in British Standard Specifications dealing with motor control and similar air break switchgear.

The Minister of Labour and National Service is to be informed of the comments of this and other Productivity Teams regarding the contrasting viewpoints on safety and accident prevention held in this country and the United States and the resulting effects on productivity.

E.A.W. Glasgow Branch

THE Glasgow Branch of the E.A.W. celebrated its 25th birthday at a dinner on 21st February, when Lady MacColl, chairman of the Scottish Council, and president of the Glasgow Branch, was in the chair. The toast of the "City of Glasgow" was proposed by Sir Norman Duke, chairman of the South East Scotland Electricity Board, the Lord Provost of Glasgow, Sir Victor Warren, replying. Dame Caroline Haslett replied to the toast of the Electrical Association for Women, proposed by Mr. J. Henderson, chairman of the I.E.E. Scottish Centre, and chief engineer, S.W. Scotland Electricity Board. The toast of the Glasgow and District Branch's 25th Birthday was proposed by Mr. E. B. Banks, commercial manager, English Electric Co., Ltd., and Mrs. M. B. Ash, chairman of the Branch, responded.

VIEWS on the NEWS

By REFLECTOR

IN securing payment for electricity from domestic consumers the usual alternative to prepayment meters is the quarterly bill. For people with low incomes, who too often forget to set aside a weekly sum for the purpose, the quarterly charge is difficult to meet. To overcome this the Watford District of the Eastern Electricity Board has employed since 1949 a system of weekly meter readings and collections. It is termed the "Gilbert" system, for reasons unknown to me, but it is by no means Gilbertian, though perhaps expensive.

In this connection, a proposal was made recently in Cape Town to revert from quarterly to the former monthly accounts. The City Council approved the idea although it was said that it would cost £15,000 extra a year.

* * *

Portable fires are the usual cause of deaths in bathrooms, but the latest fatality to be reported involves a faulty hair-dryer. The victim was an 18-year-old student nurse at Derby Hospital who was found unconscious in a bath with the hair-dryer on her body. Artificial respiration carried on for fifty minutes proved ineffectual. Evidence at the inquest showed that the dryer was eighteen years old and had been plugged into a lampholder. There was no socket in the bathroom; I think that few reputable contractors would allow themselves to be persuaded to put sockets in bathrooms after so many fatalities have occurred. But this is not enough. It is quite clear that most of these lethal appliances are connected to lighting points. The obvious conclusion is that all bathroom lighting fittings should be of an enclosed pattern in which the enclosures are not too easy to remove.

* * *

Last week I referred to the sale, at bargain prices, by some of the Electricity Boards of apparatus which had been on hire from them and their predecessors for a long time, apparently as a preliminary to winding up their hire schemes. Since then I have had a report that the East Midlands Electricity Board does not intend to follow this course. Mr. N. F. Marsh, chief commercial officer, has stated that his Board considers that the hiring of cookers and wash boilers to consumers in the lower-income group is an essential service and it does not contemplate ending it.

* * *

The debaters in last week's B.B.C. discussion on whether trading profits are too high included Mr. F. J. Erroll, M.P. for Altrincham and Sale, who will be known to readers of the *Electrical Review* for his parliamentary commentaries. Sir Richard Acland maintained that as the profits came out of the money provided by the public in the prices paid for goods, the profits belonged to the public. On the other hand Mr. Erroll contended that they were really the savings resulting from good industrial housekeeping and were equivalent to the "2s 6d a week" put aside by the housewife to buy a new gas cooker (surely "gas" was a slip of the tongue?). A third speaker held that profits were illusory. With taxation and prices at their present levels I am inclined to think the same can be said of savings.

* * *

I note that the British Electricity Authority is to go ahead with the proposed scheme for enlarging Shoreham Harbour. A statement to this effect has been issued by the harbour master. It begins:

> "I am authorised by the chairman of the Board to advise you that the Trustees have been advised by the British Electricity Authority that they have been advised to proceed. . . ."

The originator of the advice remains anonymous.

I.E.E. Dinner

Largest Post-War Attendance

NOT far short of nine hundred members and guests attended the annual dinner of the Institution of Electrical Engineers on 22nd February, which this year was held at Grosvenor House, London.

Sir Archibald Gill, president, occupied the chair and grace was pronounced by the Rev. C. L. Cresswell, chaplain of the King's Chapel of the Savoy and of the Institution.

Professor E. D. Adrian, O.M., president of the Royal Society, in proposing the toast of the Institution, said it was responsible for organizing the most powerful skill that man had acquired. When the Society of Telegraph Engineers was founded in 1877, it must already have been clear that there had been a new advance in human technique almost as far-reaching as the invention of the printing press. "You have brought us all much more together," he remarked, "and, if it has not had the expected result of making us better friends, that is not the fault of the Society of Telegraph Engineers."

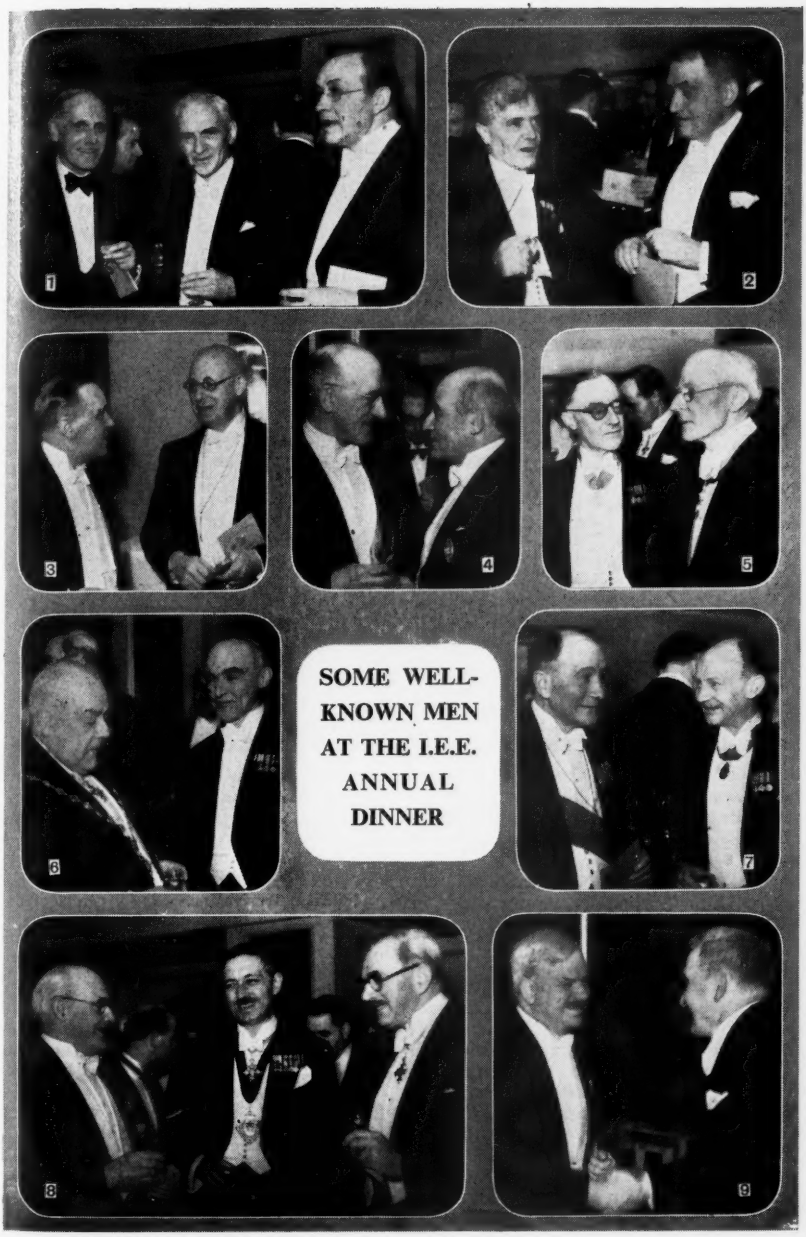
There was no human skill and no fairly simple mental operation which could not be done better by electrical means. When electrical engineering had gone further with servo devices, our factories and farms might look after themselves. The outlook for mankind might be bleak, but we were used to that, and a world inhabited by contented machines would have its points. The human brain, however, still scored over all the devices of the electronic engineer in finding out new principles and new ways of keeping us busy.

The president of the Institution, who responded, referred to the proposal to provide, with Government help, a science centre to house the Royal Society and other important societies, together with the Department of Scientific and Industrial Research and other Governmental scientific organizations, and said that the Institution also was approaching a problem of accommodation. When it acquired its present building in 1909 the membership was about 6,000 and its activities were less developed. The Council was studying the possibilities, because it was becoming obvious that the present building could not continue to serve the Institution until the lease expired in 1984. The present membership was 37,000 and was growing at an average rate of 1,500 a year, but in recent years the work of the Institution had been growing even more rapidly and expenditure had now caught up with income, so that the Council would have to decide in what directions activities must be restricted to avoid increasing subscription rates. Funds spent wisely now on furthering the objects of the Institution would, however, bring in a better return than any other form of investment.

Although it had been officially estimated that the supply of graduate electrical engineers fell short of the demand by 10 per cent, which he thought was an underestimate, the Council was convinced that the educational qualifications for corporate membership must be maintained and in some directions improved. In our technical colleges we had a potential asset well suited to our requirements, which had not been developed as it should be, but the Institution could support the proposals of the National Advisory Council for Industry and Commerce in this respect only if they were considerably modified.

One result of the collaboration between the three senior engineering Institutions

Present at the I.E.E. Dinner (see opposite page):—(1) Viscount Falmouth with Sir David Brunt, secretary, Royal Society, and Sir John Hacking. (2) Mr. T. G. N. Haldane and Sir Archibald J. Gill. (3) Sir Johnstone Wright and Mr. H. T. Young. (4) Sir Harry Railing (*right*) in conversation. (5) Prof. E. D. Adrian, president, Royal Society, with Sir Percival Waterfield, lately First Commissioner, Civil Service Commission. (6) Councillor W. E. Rice, Mayor of Westminster, with Mr. Hugh Lyon, director, Public Schools Appointments Bureau. (7) Admiral of the Fleet Sir John H. D. Cunningham and Mr. H. D. MacLaren (Admiralty). (8) Mr. E. Leete with Mr. A. Floyd and Dr. W. H. Glanville. (9) Mr. R. O. Ackerley and the President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SOME WELL-KNOWN MEN AT THE I.E.E. ANNUAL DINNER
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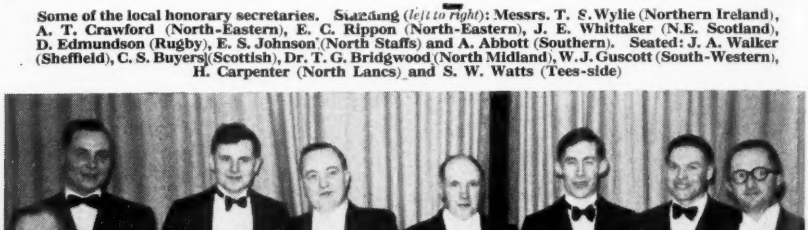
had been the establishment of the Conference of Commonwealth Engineering Institutions and of the Conference of Engineering Societies of Western Europe and the U.S.A. It was to the advantage of the profession that bodies of this kind should be set up and controlled by engineers rather than by a United Nations organization.

Professor E. B. Moullin, the immediate past-president, who proposed the toast of the guests, described the Institution as having been born " of the Royal Society wantoning with those charmers Inventiveness and Ingenuity." " In due time," he said, " that love child was deposited with our kind maternal relatives in Great George Street, who house-trained us and brought us up until we were old enough to set up in our own household." He hoped that Mr. Hugh Lyon, who was to respond to the toast and who was director of the Public Schools Appointments Bureau, would interest his boys in the creative, constructive, enterprising and learned life of the engineer, a good life, demanding high qualities of leadership and character.

Mr. Hugh Lyon, who responded, said that the need for some of the best of the youth of this country to go into our industries was being realized more clearly than ever before. " You want the best boys," he added, " and we have them." He hoped that it would be made possible for them to remain at school until the age of 18 or 18½, however, because their last year at school was of great value to them in their future career.

Sir Henry Self, deputy chairman (administration), British Electricity Authority, who also responded, expressed sympathy for electrical engineers, who were obliged to recognize in themselves a split personality, since on the one hand they wished to invent and increase the use of new electrical appliances, while on the other they were confronted with the difficulty of providing the power for them.

Some of the local honorary secretaries. Standing *(left to right)*: **Messrs. T. S. Wylie (Northern Ireland), A. T. Crawford (North-Eastern), E. C. Rippon (North-Eastern), J. E. Whittaker (N.E. Scotland), D. Edmundson (Rugby), E. S. Johnson (North Staffs) and A. Abbott (Southern). Seated: J. A. Walker (Sheffield), C. S. Buyers (Scottish), Dr. T. G. Bridgwood (North Midland), W. J. Guscott (South-Western), H. Carpenter (North Lancs) and S. W. Watts (Tees-side)**



New Automatic Telephone Dial

AFTER extensive tests over a period of five years, the British Post Office has adopted standard, a new type of automatic telephone dial mechanism designed by the General Electric Co., Ltd.

The new trigger dial reduces the possibility of dialling errors and is automatically compensated for wear. It is completely interchangeable with any existing British Post Office type dials.

Tests have shown that correct dialling is still obtained even after 20 million impulses have been transmitted. Prolonged use in the Bagdad area has demonstrated that the dial is completely dust-proof when fitted with a plastic cover at the rear, and arduous service in Singapore has confirmed that it fully withstands the effects of a humid climate.

CORRESPONDENCE

Letters should bear the writers' names and addresses, not necessarily for publication. Responsibility cannot be accepted for the opinions expressed by correspondents.

Peak-Load and the Manufacturer

I WAS interested to read your Editorial comment upon "Peak-Load Control" and the possibilities of discriminative shedding. While appreciating that the manufacturers are presented with quite a problem in the devising of equipment for such control, I do not feel, in this particular case, that it is a part of their function to decide in what form such control should be applied. If the onus is to fall upon them to first decide what form of control they consider to be the most equitable and just, to both consumer and equipment manufacturer, then I feel that they would be performing a function that, rightly, should be performed by the Electricity Authority. I am sure that if the manufacturers were presented with the problem, confined to the devising, designing and manufacturing of the necessary equipment, they would quickly provide the solution.

I am aware of four possible forms of consumption control that might be imposed during peak demand periods, which are: complete disconnection of supply, reduction of voltage, disconnection of pre-selected apparatus and limitation of total consumption to a pre-determined maximum.

The last two forms, so far as I know at the moment, would call for the installation of control equipment on consumers' premises and, in the absence of legislation, their acceptance would depend upon inducement or incentive. Manufacturers are not in a position to offer either, so this half of the problem *must* be passed to the Electricity Authorities for attention. There is a multitude of smaller attendant difficulties to be overcome all of which should be tackled by the people who are in possession of all the relevant facts and figures and are aware of the controlling circumstances. It is up to each of us to make suggestions, but up to the B.E.A. to make the decisions.

Accepting the fact that there is a general and natural prejudice against all things discriminative and a natural desire for freedom of choice, the most acceptable form of control would appear to be the limitation of the total power consumption of an establishment, during peak-demand periods, to a pre-determined maximum. Within that maximum, power could be consumed by apparatus of the consumers' choice.

The company with which I am connected is developing a control unit which is sensitive to voltage drop and is current-limiting in its operation. During off-peak periods power could be consumed to the capacity of the mains and the pre-set maximum limiter, operative during peak periods, should be simply and infinitely variable. The cost should be comparatively low.

We have made our choice of control and are developing our unit; we can only hope that our knowledge of "human engineering" is faultless and that we shall find ourselves "in phase" with the supply authorities.

This is our contribution to a common problem.

E. RUSSEL WILCOX,
Wythenshawe, Director & General Manager,
Manchester. EDWARD WILCOX & CO., LTD.

High-Speed Cyclic Operation of Induction Motors

ANYTHING tending to save time and reduce labour in a busy design office is always welcome—sometimes accepted too hastily. We are indebted to Dr. T. F. Wall (2nd February) for the neat equation:

$$\frac{\tau_s}{\tau_k} = \frac{2}{\frac{S}{S_k} + \frac{S_k}{S}}$$

which gives the shape of the speed-torque curve with fair accuracy round the maximum torque point, and has the additional merit of leading to a simple integration. Some further comment on the article is, I think, necessary.

First of all, two (typographical?) errors—the *ds* is omitted on the right-hand side of equation (8), and in the example on page 234, second column, the value of the slip for "minimum" torque should read "maximum" torque. The numerical example is not very happily chosen; in the

opening sentences full load slip is given as 10 per cent, later as 4 per cent, whereas if slip is calculated from equation (4) it works out to about 25 per cent (torque 1·1 kg.m).

The above are minor criticisms (carping if you like) but the errors are most confusing to students. An important omission is that the article does not make it clear that the mathematical treatment *applies only to a motor with free shaft*—no working load.

In many cases allowance must be made for friction, or working torque as a function of slip, and we revert again to graphical integration. Anyone doing so soon finds that the "theoretical" starting time is infinite. This has nothing to do with the approach to synchronism—the approach to any stable speed is a gradual one; as the torque available for acceleration tends to zero, the inverse becomes very large. In practice we estimate the time to reach 95 per cent (or 99 per cent) of full speed, as in the somewhat similar practical treatment of heating and cooling curves.

Sanderstead, Surrey. J. R. HENDERSON, M.B.E., B.Sc.

I HAVE read Dr. Wall's article with great interest, but it seems to me that the calculations are based on a false assumption, although I must admit that my mathematics nowadays are rather rusty.

In order to derive equation (1) HA_3^2 must equal MN^2+MH^2, but this is only true when $\angle QA_3O = 45$ deg, or when the tangent to the circle at N is parallel to A_0A_3. This, however, implies a stator of zero resistance and consequently seems to vitiate the whole argument.

I should be interested to have an explanation of this apparent anomaly.

Ipswich. J. B. HAYES, *Power and Electrical Engineer*, FISONS, LTD.

Electrical Contracting

IN the *Electrical Review* of 2nd February (p. 241) Mr. H. R. Taunton says "it [the Association of Supervising Electrical Engineers] is the only employees' organization represented on the Wiring Regulations Committee of the I.E.E. and it has representatives on the committees of the B.S.I. and other bodies."

This is incorrect as this Association (which is also registered as a trade union) is represented on the Wiring Regulations Committee of the I.E.E. and also on the committees of the B.S.I. and other bodies.

Manchester. A. PRESTWICH, *General Secretary*, Engineer Surveyors' Association.

History of "J. & P."

EVERY now and again somebody or other remarks that electricity is still in its infancy. Then there comes along such a book as "The History of Johnson & Phillips," carrying us back to 1875, as a reminder that this childhood seems unduly prolonged. The real infancy of the industry was an adventurous and stimulating period when men like Walter Claude Johnson and Samuel Edmund Phillips could undertake with few resources and little organization any kind of electrical work as then known and develop new applications in their stride.

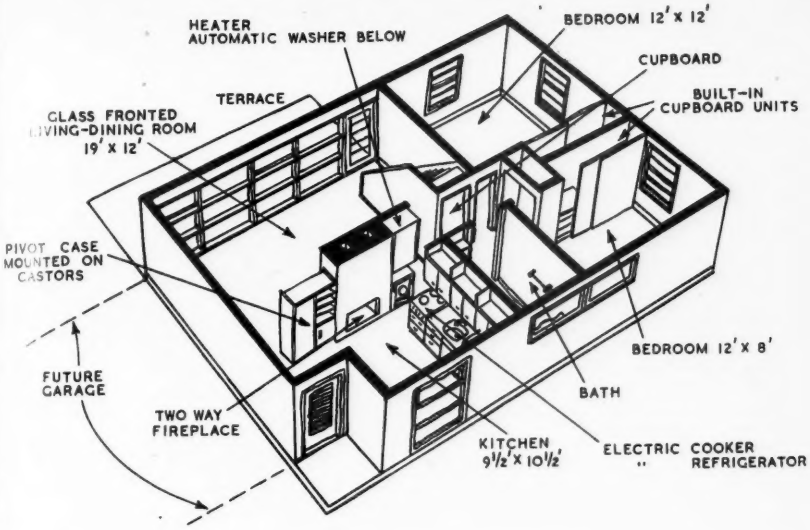
When the partnership was ended by Phillips' death in 1893 Johnson, now aided by a number of trusted senior employees controlling some hundreds of workers, carried on the work of building up the business. By the end of last century the firm's generating plant, motors, transformers, switchgear, meters and cables were in use not only in this country but in many places overseas.

Mr. Collin Brooks, the author of this book (which is sub-titled "A Romance of Seventy-Five Years") brings out strongly the human and personal aspects of his subject; an interesting chapter is that on Johnson's literary and artistic ventures.

From 1905, when the limited company was formed, the great contribution of "J. & P." to the country's electrical expansion is traced, due tribute being paid to those who with Walter Claude Johnson (he died in 1928) were responsible for the company's rapid growth. Among the familiar names mentioned are those of R. W. Blackwell (the first chairman), John Macgregor, W. B. Esson, G. C. Pearson, H. J. Sheppard, James Brockie, F. S. Paterson, E. C. Vecqueray, C. A. Hughes, Sir Philip Dawson, Charles Stewart, R. W. C. Reeves, W. Glass and G. Leslie Wates, the present chairman.

Special attention is paid to the company's work during the two world wars, including its part in the production and laying of "Pluto."

The general reader will gain from an appendix on technical developments a very good idea of the company's work in relation to the general progress of the industry. Other appendices deal with the company's electricity supply interests; the growth of its capital structure; and the past and present directors and principal officers.



Modern Home Design

Some American Examples

By MARY GILBERT

AFTER five years of planning we in Britain have but a fraction of the homes we need. What is even more pertinent, in view of electricity conservation and fuel shortages, no "right-for-the-climate" house plan seems to have emerged from much intensive research and study.

As matters stand, something more advanced is called for than the conventional two-three bedroomed "shell"—legacy of the nineteen-twenties and wantonly uninsulated—into which equipment finally is pushed, where it may or may not fit. Servicing, to be efficient, is something to be settled at the drawing-board stage, whether to definite choice or on purely alternative lines.

From the welter of material now appearing in the Press on housing and home planning several facts emerge clearly. Whether it be for this, or any other target of the future, it has been reiterated that further design research will be needed, if we are to retain the services of the small builder, the small factory, together with the architect's freedom of expression, and still reap the benefits of mass production of building components.

First, good architectural design, married to economical construction, must be the aim if we are to speed up building satisfactorily on low-cost lines. Second—it is possible to "tailor" good design without over-standardization of external appearance. (The United States speculative builder is adept at this.)

Thirdly, there must be closer study of the daily lives and requirements of the people living in these houses, so that greater flexibility is offered in the *internal* use of space. The average floor-plan for British

homes is rarely imaginative and often restrictive and wasteful, both in heating and light.

Some " expandability " should be provided to allow for increases in family needs, such as an extendable attic for children's bedrooms and garage space for building on at a later stage. Both these concessions are regular features of American low-cost housing, for they save labour and materials and reduce the owners' budgets.

The great majority of these American low-cost homes are turning to electricity for servicing. The president of one of the biggest firms handling large-scale housing development—at the rate of 4,000 homes a year for one scheme alone—stated when placing a contract for 10,000 electric kitchen appliances, " We are convinced that anything non-electrical in a home to-day will render it obsolete long before it can be amortized. . . ."

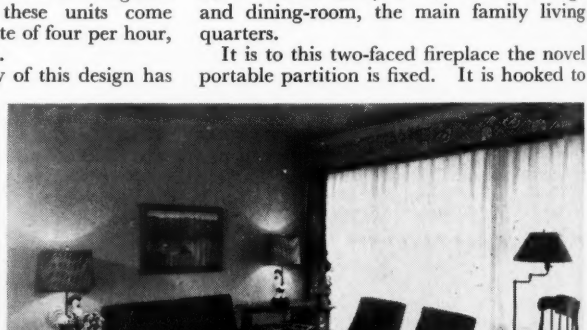
While I was in the United States recently, references to the Levitt houses on Long Island often reached me and the details I collected impressed me greatly. Priced at $7,990, complete with radiant central-heating installation, fully-equipped electric kitchen and laundry, ingenious built-in furniture and storage fittings, and a remarkable floor plan, these 800 sq ft homes are quite outstanding value, but typical of the way America is thinking and working to-day. Yet these units come " off the belt " at the rate of four per hour, complete in every detail.

Much of the economy of this design has been achieved because it is a variation of the traditional New England dwelling — the Cape Cod cottage. But the front entrance has been pushed to the corner, instead of the usual central placing, to give wider scope for interior planning. First there is a sensible floor plan. Not only is there intelligent use of space, but flexibility is extended by the use of moveable storage partitions, mounted on castors, that swing easily into position as desired. The attics are expandable when the family grows, and can be converted into two extra bedrooms with a second bathroom, thus doubling the downstair accommodation. (A permanent stairway is already fitted for this future extension.)

Heating and kitchen servicing are neatly centralized to give the fullest value. Insulation factors too are fully respected, double-pane glazing, as a valuable heat retainer, being used for the full 16ft glass wall of the living room side of the house. Radiant heating coils, embedded in the non-basement concrete foundation, with hot air ducts placed in the ceiling, maintain a cosy temperature for the winter months, the oil-fired central heating unit being cunningly housed off the floor, on the inner partition wall, above the automatic washing machine. (Here again, with the shortest possible pipe run, the washing machine is fed with hot water with minimum heat loss.)

There is ingenious back-to-back placing of plumbing points in kitchen sink and bathroom fittings, as well as with heating units in the two-way (double-faced) fireplace, which yields heating centrally from both sides at once, to reach both lounge and dining-room, the main family living quarters.

It is to this two-faced fireplace the novel portable partition is fixed. It is hooked to



Our title picture shows the interior arrangement of the Levitt house. Right : The finely proportioned living-room of the Levitt house with a wall of insulating glass running the full length of the apartment

Kitchen of the Levitt house

one end of the brickwork, to swing inwards and so enlarge kitchen quarters for the children's playtime; or vice versa to close in for more privacy during meals and create a hallway at the entrance. Both sides of the partition are usable for storage purposes, being fitted on the kitchen side with shelves for stacking china and glass, serving dishes, etc., with a storage bin for towels. On the living-room side, there are bookshelves and a let-down desk or cocktail bar, besides a full-length cupboard for guests' coats and wraps.

The kitchen has a gleaming all-electric installation of the very latest design, occupying one wall, including an upright "apartment type" range (similar to our own conventional cooker) with three radiant boiling plates and roomy broiler-oven; sink-unit, with steel-topped fitted storage units; and a 7 cu ft refrigerator. Above are storage cabinets, and on the wall beneath at convenient level, are electric socket-outlets for the mixer, percolator and other small appliances.

At right angles from the cooker, down the passageway, stands an automatic washer which, situated below the water-heater, operates in happy relation to the kitchen sink, yet with the necessary spacing between kitchen and bathroom for servicing between loads of washing.

Built-in cupboards and thoughtful accessories are included in the purchase price. Not only do these save a heavy burden of furniture buying, but facilities are offered at reasonable rates for purchasing pieces that have been planned to suit the house, many being ingeniously interchangeable for different purposes.

Closely connected in many practical respects with the Levitt houses on Long Island is the house designed by Gregory Ain, a well-known Californian architect, for erection at an estimated cost of from $15,000 to $19,000, in groups of ten or more. This one-storey house has sliding walls and panels to enable rooms to be used for different purposes, thus avoiding the box-like feeling in rooms so often associated with small-home plans. Here, the living-room, dining area, parents' bedroom and kitchen can be opened up to form one living area. Again, the dining area is separated from the living-room by a 4½ft high storage cabinet, sliding panels making it possible to close off this area.

For heating, radiant heating coils are installed in the concrete foundations, and a glass-sectioned wall extends the full 32ft length on the terrace side.

Though planned for estate development, on mass production lines, no definite price level has been fixed, and consequently no arrangements for standard equipment have been arrived at. Hence it is interesting to note the suggested allocation of space and equipment installed for demonstrating the needs of this higher-price level of housing. With an increased space of 10ft by 11ft the "L"-shaped kitchen accommodates a full size electric range (latest push-button type), combination "zero cabinet" and refrigerator, dishwasher, garbage-disposal unit, automatic washer, electric ironer, tumbler dryer and electric hand-iron, with the usual storage cabinets and table spacing.

So much for America. Is there anything to be done here at the moment? Where the electrical industry is concerned, surely more enthusiasm can be shown for attaining electrical services for new houses at the planning stage, so that installations get a fair deal, and the tenant is assured of the fullest efficiency later. Most estates run advance surveys—and preference for electricity emerges high. That is the moment for campaigning and selling the idea firmly; and consolidation by practical follow-ups, demonstrations and similar activities.

The well-planned kitchen of the Ain house. Note ample supply of outlets for small appliances above counter space

It should be possible to install, on hire-purchase terms (in with the rent), built-in panel heating for instance; water-heaters (in with the plan and invisible); or immersion heaters (tanks properly lagged from the start); washers and drying cupboards (converted cupboards if need be), so that planning is ahead, a preliminary not an afterthought.

For satisfactory kitchen designing within limited space, knowledge ahead of equipment measures and general type is needed. Unless tenants see for themselves the possibilities before them, no sound choice can be made. The average show house never displays what could be done with advance planning.

When the time comes for the rate of house building to be increased and construction costs are reduced, shall we be ready with our well-considered schemes for the inclusion of basic electrical equipment and modern appliance installations, to give the purchaser a chance of choosing between so much bricks-and-mortar, and a pleasurable economically-run home?

Canadian Electrical Production

IN its *Monthly Review* the Bank of Nova Scotia says that in the year preceding the outbreak of the Korean war the production of heavy electrical equipment had been rising; later the availability of materials began to be a problem. The present demand for electrical appliances appears to be as large as at any time in the post-war period. Sales of washing machines, which had declined substantially in the early part of 1950, have shown a steady recovery, and sales of refrigerators, stoves and radio and television sets have continued buoyant. The production of refrigerators is running at much higher levels than the record reached in the previous year. Production of electrical equipment for the country's great power expansion programmes, of industrial motors and of telephone equipment has continued to grow.

Discussing the raw materials position the *Review* says that the reopening of three aluminium reduction plants is expected to raise the annual production rate of the metal to nearly 1,000 million lb, as against the recent rate of 750 million lb. This will be augmented to the extent of 100 million lb by 1952 by a new hydro-electric development. There is also a possibility of huge development in British Columbia. There are hopes of increased outputs of nickel, copper and lead during 1951.

Synchronous Generators

Determination of Transient Performance

IN the past, practical methods of predetermining the transient performance of synchronous generators have been based more on general considerations than on a strictly logical theory. On the other hand, general equations for the synchronous machine were derived by R. H. Park,* but these have not been widely used in practice because a direct solution is laborious.

In a paper prepared by Mr. B. Adkins (B.T.H. Co.), which was read at a Supply Section meeting of the Institution of Electrical Engineers in London last week, it is shown that, by making a number of approximations, simple solutions of the equations can be obtained for short-circuit and other fault conditions, both for the generator by itself and when it is operating with an external power system, assuming the circuits to remain balanced.

The formulæ obtained for the transient reactances and time-constants agree, in the main, with those deduced from general considerations. The author's treatment, however, demonstrates clearly what are the underlying approximations and shows what simplifications can be made when some of the components of the transient currents can be neglected.

DISCUSSION

The discussion was opened by Professor M. G. Say (Heriot-Watt College), who said that the author had carried through his analysis in terms which were readily assimilable by system engineers who were accustomed to circuit theory. He expressed the view that the time had come for a "new look" in the teaching on machine performance. There had for too long been satisfaction with the steady state, with occasional and special excursions into transients. That the comparatively new treatment of servo-mechanisms had broken away from these shackles was an indication of what should be a more general release.

Dr. J. H. Walker (B.T.H. Co.) said that the two quantities with which the system designer and the machine designer were particularly concerned—especially in connection with large water-power systems—were the direct-axis synchronous reactance and the direct-axis transient reactance. The transient reactance was frequently specified by purchasers of machinery and by consulting engineers, largely on the basis of similar practice at other stations, which was often misleading. The only sound guide as to the correct value of the transient reactance was provided by a proper investigation of the complete system on the network analyser. What would appear on paper to be small changes in the value of the transient reactance could have substantial effects on the cost, bulk and efficiency of an alternator. The transient reactance having been specified at the value based on network analysis, the synchronous reactance could to a large extent be specified independently.

Unbalanced Conditions

Mr. L. W. James (B.E.A.) expressed regret that the paper dealt only with balanced three-phase conditions. He would have liked it to include expressions for phase-to-phase and phase-to-neutral conditions which were more usual. With regard to the assumption that the subtransient and transient reactances were constant and once determined did not vary, he expressed the view that in actual practice they varied appreciably, depending on the voltage to which the short-circuit was carried up.

Mr. M. W. Humphrey Davies (Imperial College) said that experimental investigations were being made with regard to saturation but the work was at too early a stage for him to offer any definite conclusions. He gave a preliminary outline of the method.

Mr. L. D. Anscombe (B.T.H. Co.) said that the difficulties confronting a discussion on the paper arose in part from the fact

* *Trans. A.I.E.E.*, 1929, 48 No. 2, p. 716, and *Gen. Elec. Rev.* June 1928, 31, p. 332.

that the treatment of the subject related only to the ideal synchronous machine with salient poles and a perfectly laminated magnetic circuit throughout. One very important machine—the low-speed water turbine driven alternator—was very close to the ideal machine, but the majority departed widely from the ideal, and contained solid parts. Any addition to or adaptation of the circuit theory demonstrated in the paper must clearly involve an excursion into field theory so as to deal with transient flux penetration into the solid parts, and this was undoubtedly a difficult subject. He himself had always believed that the presence of solid metal in the rotor had a marked effect only on subtransient quantities and was therefore significant only in relation to short-circuit studies, but from the discussion it would appear that there was considerable variation in the transient reactance.

Axis Windings

Mr. S. Neville (Metropolitan-Vickers) expressed some doubt about the fictitious axis windings which were brought in to transform the equations into a form in which they could be used. He considered the assumption of sinusoidal flux untenable because the machine was no longer a salient-pole machine. He pointed out that there were three windings on the direct axis on the author's model—the stator winding, the damper winding, and the main field winding. If he was not mistaken the author used a single mutual inductance between them, but there should surely be three, even though one could be expressed in terms of the others. The paper made a very valuable contribution to knowledge in the way in which it traced the connection between out-of-phase analysis and the equivalent circuit treatment in its various stages of simplification.

Mr. R. Gill (Imperial College) described an apparatus which had been developed for determining the direct-axis synchronous reactance and the quadrature-axis synchronous reactance for a machine while it was working under normal conditions without disturbing its operation.

Mr. J. Douglas said that the best description of transient reactance was to compare it with sticks set up in the sand at the seaside. After a wave had retreated the sand was found to have moved away where the sticks went into the ground. Looked at in that way, with an ordinary symmetrical short-circuit, the three-stator windings made a sine wave m.m.f. and if that was put on to the damping winding the obvious assumption was that each damping could be represented as a sine wave of flux.

Mr. G. Lyon found the paper reassuring in that it provided a very sound mathematical basis for assumptions which engineers had been accustomed to use. The very close agreement of the calculated and test results for the ideal machine were pleasing. He was not sure how use could be made of very high accuracy of the order of $\frac{1}{2}$ to 2 per cent, since the remaining information on the basis of which to carry out system studies was far less accurate. It was difficult to know how to handle the reactance transient and other information, once it was obtained. Many studies, particularly stability studies, presented difficulties.

Mr. E. M. Johnson (Metropolitan-Vickers) said it would have added enormously to the value of the paper if the author could have made, say, ten sets of tests and shown that the average results agreed with the calculations.

The author briefly replied.

Industrial Accidents

At a meeting of the Association of Supervising Electrical Engineers in London last week Mr. H. Midgley, chief safety officer, British Electricity Authority, gave a lecture entitled "Accidents and the Supervising Electrical Engineer's Responsibilities." The president of the Association, Mr. T. G. N. Haldane, presided.

Referring first of all to the Factories Act, Mr. Midgley discussed the responsibilities of persons who sold or let on hire plant and equipment, of the occupier, of persons employed by the occupier in his factory, and of contractors and their employees engaged by the occupier on work which was not a normal process carried out in the factory. Turning to the question of safety in electrical matters he gave statistics of electrical accidents in connection with associated electrical equipment and of accidents happening most frequently in connection with portable electrical apparatus, switchgear and crane trolley wires. He concluded by discussing general safety, giving statistics of all types of accidents and various suggestions for their prevention.

PARLIAMENTARY NEWS

From Our Special Reporter

In reply to a question by Mr. T. Brown, the Postmaster-General (Mr. Ness Edwards) circulated a statement showing the number of telephones installed annually from 1920 to 1950. This showed that in 1919–20 110,000 were installed; in 1929–30, 217,000; in 1939–40, 281,000; and in 1949–50, 540,000. The greatest number installed in any one year was 665,000 in 1946–47. For the current financial year, the number is expected to be about 550,000.

Hydro-Electric Schemes

Mr. Noel-Baker, replying to Mr. Heatheral Amery, said that the British Electricity Authority had under consideration a number of hydro-electric projects of small and medium size, and investigations were proceeding to see whether they would be economically sound.

Water Power in British Honduras

Mr. J. Griffiths, Secretary of State for the Colonies, told Mr. H. Hynd that an investigation was at present being made of hydro-electric possibilities in the Stann Creek and Belize areas, British Honduras.

Extruded Brass Rods

Mr. Erroll asked the Minister of Supply what arrangements he had made to ensure that contractors other than the Royal Ordnance factories and the Admiralty who were engaged on defence contracts could obtain the extruded brass rods necessary for those contracts; and whether he was satisfied with the efficacy of those arrangements.

Mr. J. Freeman said that all first line users, including the makers of extruded brass rods, were aware that defence requirements were to be met in full and he had no reason to suppose that they were not complying with the Government's wishes. The British Non-Ferrous Metals Federation had undertaken to look into cases of difficulty which were brought to its notice by the Ministry of Supply.

Hire-Purchase of Fires

Mr. Maudling asked the President of the Board of Trade if, in view of the need for fuel economy, he would extend the provisions of S.I. No. 39, 1950, which restricted hire-purchase credit facilities for price-controlled goods, to electric fires.

Mr. Harold Wilson said that domestic heating appliances were included in the current review of those price controls over consumer goods which had been withdrawn since the war. If, as a result of that review, statutory price control was re-imposed over electric fires, the provisions of the Hire Purchase Order made under the Goods and Services (Price Control) Act, 1941, would again apply to them.

The Electricians' Strike

Mr. Osborne asked the Lord President of the Council why the extra 2d per hour which was to be paid to electricians working on the Festival of Britain site and was to be backdated to 26th January was not paid when originally demanded which would have avoided the strike; and whether the work was being done on a cost-plus basis.

Mr. H. Morrison said that the claim made by the electricians was one for settlement between both sides of the industry. There were no cost-plus electrical contracts.

Yorkshire Board's Extensions

Mr. Kaberry asked the Minister of Fuel and Power what was the amount of the expenditure incurred by the Yorkshire Electricity Board on extensions to its headquarters at Scarcroft, West Leeds, in excess of the sums authorized; and what instructions he had given or intended to give for the prosecution of any offenders.

Mr. Noel Baker said that in 1949 his predecessor approved plans for the extension, in stages, of the former Yorkshire Electric Power Co.'s headquarters at Scarcroft to enable the Yorkshire Electricity Board to concentrate its staff as far as possible. The total estimated cost was £39,250, but this did not include expenditure later found necessary to replace the heating system in the old buildings and extend it into the new buildings, nor did it include electrical wiring and other works carried out by the Board's own employees. The omission of this work from the estimate led to omission also from the application for authorization. Nor was any authorization sought for other extra expenditure amounting to £13,581. Except for a very small amount this expenditure was necessary for the proper completion of the building in accordance with the approved plan, and had the various items been submitted to him he had no doubt he would have authorized them. He was satisfied, after consultation with the Minister of Works, that this was not the sort of case in which proceedings should be taken, whether they involved a private individual or a public body.

COPPER AND ZINC ORDERS

Lists of Prohibited Uses

STATUTORY effect has now been given to the announcement made by the Minister of Supply on 28th December last about the prohibition of the use of copper, zinc and their alloys in the manufacture of certain goods. Two Orders have been made. They are : The Copper and Zinc Prohibited Uses (Board of Trade) Order, 1951 (S.I. No. 275 of 1951) by the Board of Trade for those articles for which it is the sponsoring Department, and the Copper and Zinc Prohibited Uses (Ministry of Supply) Order, 1951 (S.I. No. 277 of 1951) by the Ministry of Supply for all other articles affected by the restrictions.

These Orders came into operation on 1st March. A number of amendments have been made since the provisional list was published, wherever possible in consultation with bodies representing the industries concerned. Some definitions have been revised and in a number of cases the wording of the definitions has been brought into line with trade practice.

Manufacturers may use until 1st July stocks of copper, zinc and their alloys in fabricated or partly processed state, which they had in hand on 1st March. The Orders cover alloys containing copper and/or zinc to the extent of 40 per cent or more by weight. They therefore prohibit the use of brass, mazac, gilding metal and nickel silver but not pewter. The issue of licences will be considered for special purposes. Consideration will also be given to articles in which very small amounts of zinc and/or copper are needed for essential purposes, such as for gear wheels. Applications for licences should be made in the first place to the Regional Office of the Department concerned. The Orders are available from H.M. Stationery Office, No. 275 at 4d and No. 277 at 2d.

Ministry of Supply Schedule

The Schedule of prohibited uses under the Ministry of Supply Order includes bodies and lids of electric kettles, saucepans, coffee percolators, waffle plates, and similar portable cooking or water-heating appliances ; conduit bushes, conduit fittings ; conduit tubing (except conduit tubing incorporated in machinery) ; covers for tumbler switches ; domestic fan blades and guards ; junction box covers ; plates for bell-pushes, sockets, switches ; reflectors, guards, and ornamental parts of electric radiators or of bowl fires ; wiring clips ; non-current carrying wiring fittings ; bells, door chimes (except current carrying parts).

The bodies of these articles may not contain copper, zinc and their alloys, but they may be surface finished with these metals ; they may be galvanized, plated, sprayed, etc.

The Board of Trade Schedule lists articles in the body of which zinc, copper and their alloys may not be incorporated, but which may be galvanized or plated. These include illuminated advertising signs and display equipment (excluding transformers, cable and other current carrying components) ; lighting fittings and accessories, of the following types :—Ornamental lighting fittings, including table and standard lamps and lampshades (but excluding flex and current carrying components incorporated in such fittings), nose pieces and necks, nuts, screws and bolts, inserts for mouldings and nipples ; lighting reflectors, shades, galleries, shade carriers and suspension chains, but excluding nuts, screws and bolts, inserts for mouldings and nipples.

Venezuelan Electrification

A BOARD of Trade Special Register circular gives details of the plan recently completed by the Electricity Department of the Venezuelan Development Corporation for the electrification of the country.

For the purpose of the latest scheme, the country has been divided into four zones. At first, each will be self-contained, but when the majority of the generating stations have been completed, it is proposed to connect the four local power networks, thus forming a large grid scheme, linking, as was the object of the original plan, Western, Central and Eastern Venezuela, which would include the Caroni River hydro-electric undertaking. The main falls on this river, which constitutes the largest potential source of hydro-electric power in the country, are near to a centre of growing importance, due to the recent discovery of large deposits of high grade iron ore in the surrounding country.

The principal power stations to be constructed under the present plan, with proposed completion dates, are as follows:—Western Region: Uribante River (San Cristobal), 30,000 kW hydro-electric (1954) and San Lorenzo (Motatan) 20,000 kW thermal (1954). Central Region: Extension of La Cabrera thermal station to 22,500 kW (1951) and 40,000 kW (1955). Eastern Region: Puerto La Cruz, 30,000 kW thermal (1955) and San Tome, 30,000 kW thermal (1955). Caroni River: San Felix, 50,000 kW hydro-electric (1955) with possible ultimate extension to 200,000 kW.

Bulk Supply Charges

Increase from 1st April

THE British Electricity Authority has given notice that the cost of electricity to the Electricity Boards will be increased as from 1st April. On that date, a revised tariff will come into force which is estimated to increase the overall cost of bulk supplies by approximately 2 per cent, although the effect on individual Boards will vary. This increase is exclusive of the effect of the recent rise of 4s 2d per ton in the price of coal. The new tariff will apply on a uniform basis to all Electricity Boards, subject only to regional fuel cost adjustments.

The maximum demand charge has been raised by 7s 6d/kW (from £3 15s 0d to £4 2s 6d) but the running charge has been reduced from 0·335d to 0·33d/kWh, reflecting economies in operating costs resulting from the new and more efficient plant, and is subject to a coal price adjustment of 0·0007d per 1d variation in the price of fuel in the respective Areas from a basic figure of 38s/ton.

The raising of the kW demand charge is made necessary by a change in the basis of assessment, the rising capital charges on new plant and equipment and other increased costs, and the decision of the Authority to build up its statutory central reserve fund out of its own revenues instead of relying only on contributions from the Electricity Boards as hitherto.

This change of assessment was foreshadowed in the Authority's annual reports. The chargeable demand will be the simultaneous m.d. of a Board on the Authority instead of, as formerly, the two years' average of the aggregate m.d. at all points of supply in the respective Areas.

As in the case of the tariff for 1950/51, the m.d. will be measured on working days during the daytime, between 7 a.m. and 7 p.m. from Monday to Friday and 7 a.m. to noon on Saturday. If the demand so measured is exceeded by the demand at other times, the excess will be charged for at the rate of one-third of the demand charge. This is designed to encourage the development of night and week-end loads and thus improve the national load factor.

East Midlands Reorganization

UNDER a scheme for the reorganization of its Area, to be completed by the end of March, the East Midlands Electricity Board is reducing the number of Sub-Areas from nine to eight and large parts of the Area hitherto administered from Sub-Area headquarters will now be under the control of District managers.

The three "city" Sub-Areas—Coventry, Leicester and Nottingham—will remain as at present. The five others, with their districts, will be as follows:—

Derbyshire and Nottinghamshire.—Chesterfield (manager Mr. W. W. Grimes), Ilkeston (administered by Sub-Area), Mansfield (Mr. A. Latham), Matlock (Mr. C. G. Bloore), Newark (Mr. R. E. Livesley) and Worksop (Mr. G. R. Laithwaite).

Leicestershire and Warwickshire.—Coalville (Mr. F. Gowdridge), Hinckley (administered by Sub-Area), Leamington (Mr. I. A. A. Macdonald), Loughborough (Mr. D. C. Whyte), Nuneaton (Mr. J. Billcliff), Rugby (Mr. H. G. Middleton) and Tamworth (Mr. J. Walton).

Northamptonshire.—Bletchley (Mr. J. C. Bland), Daventry (Mr. D. Youdan), Kettering (Mr. C. Binns), Northampton (administered by Sub-Area) and Wellingborough (Mr. C. A. Cullimore).

Derby and Burton.—Derby (administered by Sub-Area), Burton (Mr. F. Overstall) and Uttoxeter (Mr. A. McGregor).

In describing the new arrangements in the Board's *Journal*, Mr. John Mould, deputy-chairman of the Board, says that the reorganization represents a considerable advance in the policy of devolution of responsibility to District managers. Accounting and purchasing organizations will remain on a Sub-Area basis and so will sections of the engineering work, such as operation and construction of primary transmission and certain other major construction works. But operation of distribution networks and repairs and maintenance generally will be the job of the District staffs. On the commercial side, which embraces every aspect of load development, sales and service, the Board attaches the utmost importance to the relationship existing between the consumer and the District staff.

NEW E.D.A. FILMS

TO the series of fifteen educational films which have been produced at Merton Park Studios for the British Electrical Development Association a further three have been added and we had an opportunity of seeing them last week.

The first, a companion film to "What is Electricity?" is "Magnetism," which demonstrates by a skilful combination of photography and animated diagrams the nature of magnetism and its effects and uses. Of particular interest are some photo-micrographs taken at Nottingham University showing the actual physical effect of magnetizing metal.

"Domestic Hot Water" proceeds from the electric kettle to the action of the immersion heater and its accompanying thermostat. The operation of a domestic hot-water system is graphically demonstrated and explained. This film can be regarded as "developmental" as well as educational, for it does not forget to put in a word for electricity, comparing it favourably with solid fuel for water heating.

In the third film "Electricity and Light" the filament lamp, electric arc and discharge tube are explained and demonstrated. The last part is in colour but the limitations of the process result in less than justice to the bright hues of modern discharge lighting.

The films run for about a quarter of an hour each. They are available (in the 16 mm size) on loan free of charge from the general manager and secretary of the British Electrical Development Association (Mr. V. W. Dale), 2, Savoy Hill, London, W.C.2.

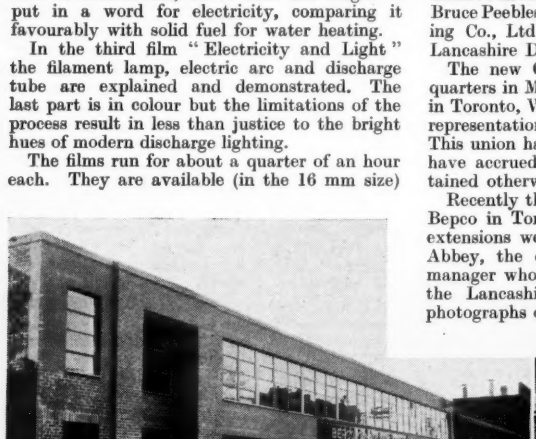
At the showing of the films Mr. Philip Honey of E.D.A. briefly commented on each and afterwards Mr. Dale mentioned that in 1950 the number of applications for the films reached the record figure of 9,600. About a thousand prints had been sold. Mr. Dale paid a tribute to the work of Messrs. Honey and Stedman in connection with these films and congratulated the producer, Mr. F. A. Hoare, upon the results.

"BEPCO" EXTENSION

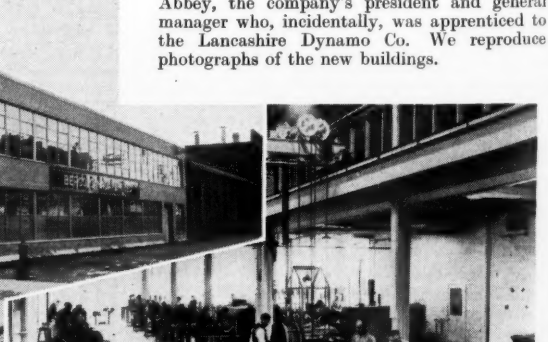
IN 1933 four British electrical manufacturing concerns which maintained separate organizations for the handling of their products in Canada combined to form Bepco Canada, Ltd., to serve all four. The companies concerned were Bruce Peebles & Co., Ltd., the Harland Engineering Co., Ltd., Crompton Parkinson, Ltd., and Lancashire Dynamo & Crypto, Ltd.

The new Canadian company had its headquarters in Montreal and branches were opened in Toronto, Winnipeg and Vancouver with sales representation in other important centres. This union has been very successful and results have accrued which might not have been obtained otherwise.

Recently the office and workshop premises of Bepco in Toronto have been doubled and the extensions were officially opened by Mr. C. G. Abbey, the company's president and general manager who, incidentally, was apprenticed to the Lancashire Dynamo Co. We reproduce photographs of the new buildings.



Exterior of the new Bepco premises; the original buildings are seen on the right



A view of the new workshop taken from the end of the older one of which it forms an extension

Commerce and Industry

Technical Teachers' Salaries

Edinburgh Power Exhibition

THE Burnham Committee has recommended to the Minister of Education a new scale of salaries for teachers in technical colleges and institutes; it is recommended that they should be put into operation on 1st April. The salaries are in four grades:—Those for Grade A assistants would range from £375 to £630 for men and from £338 to £504 for women; Grade B assistants from £450 to £725 for men and £405 to £580 for women; lecturers from £900 to £1,000 for men and from £720 to £800 for women; and senior lecturers from £1,000 to £1,150 for men and £800 to £920 for women. It is recommended that male heads of departments should be paid from £900 (rising to £1,000) to £1,450 (rising to £1,600). There are a number of proposals to cover special circumstances.

Iron and Steel Orders

The Minister of Supply has signed an Order making certain amendments in the Iron and Steel distribution scheme. The Order enables the Ministry of Local Government and Planning to authorize the acquisition of steel sheets and tinplate, and also deals with the price limit under the Small Quantities Exemption of Tinplate. The Order (the Control of Iron and Steel (No. 80) Order, 1951, S.I. 1951, No. 276), came into force on 23rd February and amends the No. 62 Order (Principal Order) of 28th January, 1948.

Increases in the maximum prices of iron and steel came into operation on 21st February. The new prices are mainly a result of the recent increase in the price of coal and coke. The increases are included in an Order made by the Minister of Supply which also consolidates previous Iron and Steel Prices Orders, and provides for certain minor changes. The Order (the Iron and Steel Prices Order, 1951, S.I. No. 252), is obtainable from H.M. Stationery Office.

Projector Lamps Tax Exemption

The Treasury has made an Order under Section 21 of the Finance Act, 1948, entitled the Purchase Tax (No. 2) Order, 1951 (Statutory Instruments, 1951, No. 271), the effect of which is to exempt from tax electric filament lamps suitable only for use in cinematograph projectors or in projectors for slides or for film strips. The exemption is regarded as applying to vertical burning projector lamps classified under Class A1 of the schedule issued by the Electric Lamp Manufacturers' Association and to exciter lamps classified under Class G. Projector lamps in other classes of the Association's schedule are chargeable with tax under Group 14 (c) (ii) unless of a rating exceeding 250 W. The Order applies to goods of the kinds specified which are delivered on sale, or appropriated to retail trade or similar purposes, on or after 26th February, and to imported goods which are entered with the Customs, or which are delivered from bonded warehouse for home consumption, on or after that date.

Piecework Ban Ended

Last week the employees at Trafford Park Works of the Metropolitan-Vickers Electrical Co., Ltd., decided to resume piecework on Monday last. Negotiations will be opened with the employers for a revision of piecework rates. The refusal to operate on piecework was taken in December as a protest against the effects of the last engineering wages agreement from which, the men claimed, they derived no benefit.

Further Electricians' Strikes

Following upon the award of an extra 2d an hour to electricians working at the Festival of Britain sites on the Thames South Bank and Battersea Park, electricians employed on the preparation of the Festival exhibition at the Science Museum, South Kensington, demanded a similar increase last week. The claim was rejected and the men ceased work on Friday last. The dispute has been referred to the Ministry of Labour.

About 600 men engaged in the installation departments of the London Electricity Board stopped work on Friday last. It is stated that the strike originated in Bethnal Green where there was a dispute about a labourer's union membership.

C. A. Parsons Activities

In the February *News Letter* published by C. A. Parsons & Co., Ltd., Sir Claude Gibb, managing director of the company, says that he is visiting Canada and Australia. In Toronto he will inspect the Richard L. Hearn power station in which four 100 MW Parsons sets are to be installed. The first set is expected to arrive a few days after Sir Claude's arrival. He says that at the present time the company has over

1,000 MW of turbo-alternator plant under erection, being manufactured or on order for Australia.

Expansion of business makes it likely that the works will have to be extended and they are hoping to secure additional land for that expansion adjacent to the Heaton South works. First they wish to increase the capacity of the apprentices' training school because of the shortage of skilled craftsmen and engineering office staff.

Box and Carton Industry Productivity

The Anglo-American Council on Productivity has published the report of the productivity team representative of the rigid boxes and cartons industry which recently visited America. This team, like its predecessors, found greater productivity in the United States than in Great Britain (in some cases 50 to 70 per cent more). At the time of the visit, productivity was at its peak in this industry. Reasons for this higher productivity, in the opinion of the team, include the fact that machines are run faster without fatigue to the operators, plant layout is good and great attention is paid to detail, particularly in the preparation of work. Reference is also made to the effect of competition for employment, lower taxation and other contributory causes.

Sales Management Examinations

The Council of the Incorporated Sales Managers' Association announces that qualifying and final examinations in sales management will be held in London and a number of provincial centres from 24th to 26th May. Entry forms, together with syllabus and regulations, may be obtained from the secretary, I.S.M.A., 4, Holborn Place, London, W.C.1. The closing date for entries will be 30th April. The Council also announces that the practice of holding additional examinations in December of each year has ceased. Annual examinations will, in future, be held in May or June.

Burglar Alarm Exhibition

Electricity was well to the fore at an informative exhibition, with the emphasis on "Beat the Burglar," which the Brighton Police arranged at the Corn Exchange last week. A foolproof system was shown by the Auto Call Co., Ltd., covering all known eventualities. The slightest sound made by an intruder is picked up by microphones and can be heard by the night watchman in his office, while if the electric circuit is broken by cutting the wires an alarm sounds. Apart from these precautions there are invisible infra-red rays the breaking of which sets off the alarms on the premises and at police headquarters. The Rely-a-Bell Burglar & Fire Alarm Co., Ltd., among mechanical devices, demonstrated open and closed circuit alarms which automatically start a loud-speaking gramophone for passers-by to hear, and a "999" call. There was an exhaustive explanation and demonstration of the "999" telephone system, together with the police car system, and the latest Post Office device ensures that once two 9's have been dialled the particular number can be identified even if the alarm call is not completed. Of interest to radio students, there was a large-scale illustration of the police pocket radio receiver. The rest of the exhibition was devoted to the ordinary safeguards against burglary, such as good locks, safes and mechanical devices which cause safety shutters to drop.

Ex-J. & P. Association

The annual dinner of the ex-Johnson & Phillips Association will be held to-morrow (Saturday) at Grosvenor House, Park Lane, London, W.1, at 7 p.m. The dinner will be preceded by a general meeting of the Association at 5.30 p.m. Tickets (£1 1s each) can be obtained from Mr. H. D. Parsons, hon. secretary, at "Heigham," 20, Beaumont Road, Orpington, Kent.

Larger "Silverlight" Lamps

A number of members of the Electric Lamp Manufacturers' Association announce the extension of the range of "Silverlight" (silica coated) lamps to the 150 W and 200 W sizes (3s 5d and 5s 8d respectively, including purchase tax).

Windmills for Shop Lighting

Recently we referred to the four windmill generators installed on the roof of the Cumberland Hotel, Marble Arch, London, by J. Lyons & Co., Ltd., for lighting the windows of the Marble Arch "Corner House" in view of the present restrictions on the use of electricity from the mains for this purpose. The first installation of the kind reported from the provinces is at Western Road, Brighton, where a drapery firm, Dorothy Norman, Ltd., have erected two wind-driven generators on the roof to light the shop window at night. About 24 lamps are used, giving ample illumination to the window display.

Fluorescent Stage Lighting

A lecture and demonstration of fluorescent stage lighting was given on 19th February at the Regent Theatre, Kings Cross. Although this was organized primarily for the benefit of some 200 students and members of the staff of the Regent Street Polytechnic School of Architecture, the Central School of Arts and Crafts and Faraday House Engineering College, many prominent members of Electricity Boards and the theatrical profession were also present. After an introduction by Mr. A. Stanley Shier, director of Thorn Electrical Industries, Ltd., who have produced and developed the system,

technical information was given by Dr. J. W. Strange and Dr. H. H. Ballin and afterwards a discussion was opened by Mr. John Reid, A.R.I.B.A.

Scottish Dairy Show

"Clean Milk Production with Electricity" was the theme of the electricity stand at the Scottish Dairy Show. A large map was used to illustrate that the territory in south-west Scotland to be first affected by the Tuberculosis (Attested Herd) Scheme, 1950, lies largely within the area served by the South West and South East Scotland Electricity Boards. The accompanying text stressed that the Electricity Boards in Scotland were very much alive to the problems confronting dairy farmers in their fight against T.B. infection. Electrical equipment, by means of which increased cleanliness could be achieved, was demonstrated under the headings of water pumping, milk cooling and handling and sterilizing. A novel feature on the stand was a 30-seat cinema, employing a daylight back projection unit. E.D.A.'s film "Fifty Acres" was the outstanding favourite. The stand was organized by the South West Scotland Electricity Board in conjunction with the South East Scotland Electricity Board, the North of Scotland Hydro-Electric Board and the British Electrical Development Association.

Raw Material Supplies

This week a committee of the new International Materials Conference held its first meetings in Washington to discuss the production and allocation of supplies of copper, lead and zinc. This is one of a number of committees which will consider the supply of essential raw materials. About twelve countries, including the United Kingdom, are participating in the conference.

Domestic Appliance Market

Surveys carried out by Hoover, Ltd., indicate that the market for vacuum cleaners is as big as ever, while that for washing machines is virtually untouched. It is calculated that there are five million or more opportunities for new sales of cleaners, plus well over one and a half million replacement possibilities. Approximately 57 per cent of all households possess cleaners. In the upper income group, which represents 11 per cent of the total, 96·8 per cent of the households have cleaners. For the middle income group (25 per cent of the total) the figure is 82 per cent, while among the remaining 64 per cent of the households included in the lower income group only 37·8 per cent yet have cleaners.

A survey of the washing machine market indicates that only 6·5 per cent of all households have washers, the percentages for the various income groups being: upper, 18·4; middle, 10·4; lower, 3·7. With settled conditions and no raw material problems there is no doubt that sales of both appliances would attain new heights.

Submersible Floodlights for Festival

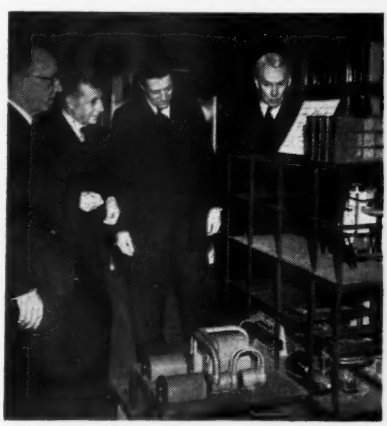
Over 600 floodlights of a new submersible type designed by the General Electric Co., Ltd., have been ordered for the South Bank site of the Festival of Britain, where they will be used for illuminating fountains. Working on the diving bell principle, this fitting measures only 12in high by 8in diameter and consists of an external cylinder, closed at the top by a sheet of $\frac{3}{8}$ in armour plate glass, inside which is fitted a second cylinder, closed at the bottom. This inner cylinder forms the lamp chamber, and the metal box housing the connector is sealed to prevent air from inside the unit escaping along the cable.

An "Osram" 150 W spotlight reflector lamp with an internally silvered bulb is used, and is positioned so that the beam is about 15 deg from vertical. Lamp replacement is easy because there is no watertight joint to break and re-seal.

Edinburgh Electrical Power Exhibition

To provide the public with an opportunity of observing the trend of scientific and engineering development in the electrical field an exhibition organized by the South East Scotland Electricity Board and the Royal Scottish Museum, in co-operation with the British Electricity Authority, the North of Scotland Hydro-Electric Board and electrical

Left to Right: **Dr. D. A. Allan, Professor Sir Alexander Gray, Sir Norman Duke and Sir John Mackay Thomson, inspecting a model of the boiler recently installed at Portobello power station after the opening of the Electrical Power Exhibition in the Royal Scottish Museum**



manufacturers, was opened on 21st February at the Royal Scottish Museum by Sir Norman Duke, chairman of the South East Scotland Board.

Generation and transmission of electricity are covered mainly by models and photographs, items of special interest being a "fuel cell" for producing electricity direct from fuel without going through the steam stage, and a "Recollectograph," which makes records of currents and voltages and after a short interval expunges them.

Prices of Materials

In the accompanying table we give the prices of the more important materials used in the electrical industry. The figures are those quoted on Monday last.

ALUMINIUM Ingots	ton £124 0s 0d
COPPER, H.C. Electro	ton £202 0s 0d
Fire Refined 99·7 per cent ..	ton £201 0s 0d
Fire Refined 99·2 per cent ..	ton £200 10s 0d
LEAD, English	ton £137 10s 0d
MERCURY..	flask £73 10s 0d
TIN	ton £1,485 0s 0d
ZINC, G.O.B. Foreign	ton £151 0s 0d
Electrolytic	ton £155 0s 0d
BRASS Tubes	lb 1s 9½d
Sheet	lb 2s 1½d
Wire	lb 2s 3½d
COPPER Tubes	lb 1s 11½d
Sheet	ton £252 0s 0d
H.C. wire and strip	ton £226 10s 0d
PHOSPHOR BRONZE	
Wire	lb 3s 5½d
RUBBER, No. 1 R.S.S. spot ..	lb 71–72d

Trade Announcements

Ekco-Ensign Electric, Ltd., announce the appointment of four new representatives. Mr. E. Jackson and Mr. G. D. Ruskin will be based at the company's southern sales office, at 5, Vigo Street, London, W.1, and Mr. R. Baker and Mr. D. McLeod at the company's office at 26, India Street, Glasgow.

The Sales Department of the **Sloan Electrical Co., Ltd.**, has been transferred from the company's Kingsway office to Slonetric House, Bondway, Vauxhall, London, S.W.8.

The business of the **Hirst Electrical Co.** has been taken over by **Hirst Electronic Development, Ltd.**, which will continue to carry on the business at Dermody Road, London, S.E.13.

To safeguard continuity of production, arrangements have been made for the standard and de luxe washing machines manufactured by **H. Fisher (Oldham), Ltd.**, to be fitted either with the company's own power wringer or with a new power wringer (Type A.75) made by Acme Wringers, Ltd.

Scemco, Ltd., has distributed quantities of cards advertising its lighting fittings to 7,500 electrical traders in this country for distribution to their customers. The cards are overprinted with the individual trader's name and address.

Sharp Control Gear, Ltd., has removed from Birmingham to Lount Works, Ashby-de-la-Zouch, Leics. (telephone : Ashby 422).

Lawrence & Hanson Electrical Pty., Ltd., of Melbourne, have changed their name to **Lawrence & Hanson Electrical (Vic.) Pty., Ltd.**, and have also changed their address to 172-176, William Street, Melbourne, Victoria, Australia.

Catalogues and Lists

Thermega, Ltd., 51-53, Victoria Street, London, S.W.1.—Leaflet announcing increased prices of "Thermega" electric blankets and heating pads.

George H. Scholes & Co., Ltd., Wylex Works, Wythenshawe, Manchester.—Priced catalogue of switch-fuse units.

Muirhead & Co., Ltd., Elmers End, Beckenham, Kent.—Technical folder (B.668B) describing the D-601-A picture transmitter for use on telephone circuits.

Chloride Batteries, Ltd., Exide Works, Clifton Junction, Nr. Manchester.—Catalogue of batteries for diesel engine starting purposes.

General Electric Co., Ltd., Magnet House, Kingsway, London, W.C.2.—Illustrated folder on electrically heated metal melting pots.

Premier Electric Heaters, Ltd., Keeley Street, Birmingham, 9.—Illustrated folder announcing increased prices of domestic appliances.

Smart & Brown (Engineers), Ltd., Spennymoor, Co. Durham.—Priced catalogue of "Hi-Craft" fluorescent lighting fittings.

Sarum Electric, Ltd., 68, Brown Street, Salisbury, Wilts.—Priced catalogue of immersion heaters.

Harris Engineering Co., York Works, Browning Street, London, S.E.17.—Two folders, one on unit heaters and the other on dust collectors.

Telegraph Construction & Maintenance Co., Ltd., Telcon Works, London, S.E.10.—Folder on "Telcon" cables for broadcast relay and sound distribution.

Bathroom Fatality

When an inquest was held at Coventry recently on William Tudsbury, aged fifty, a maintenance electrician, who was found dead in the bath at his home, it was stated that the cause of death was electric shock. An infra-red apparatus in the bathroom was examined and the wiring was found to be faulty at a point which could easily be touched. A verdict of "accidental death" was recorded, the coroner pointing out the danger of using electrical apparatus in bathrooms.

OVERSEAS ELECTRICAL TRADE

A Good Start for Exports in 1951

WHILE reclassification of certain products and the introduction of new headings render exact comparison impossible, the January figures for exports of electrical apparatus and machinery provide an encouraging start for 1951. The total for the month amounted to £12,333,738, which was £1,101,061 above the January, 1950, figure, and was only £54,935 less than the record total for August. The figures omit such items as boilers, refrigeration plant, compressors, fans, food preparation machinery, machine tools, mining machinery, pumps, textile machinery, etc., all of which are largely electrically operated.

Indicative of the progress made in the washing machine market is the fact that this apparatus is now separately classified, the total of £290,580 for January showing an advance of £45,038 over that for the corresponding period of last year. Another

TABLE I.—ELECTRICAL EXPORTS

Class	January, 1951	January, 1950
	£	£
Telegraph and telephone cables and wires (submarine)	35,921	41,097
Ditto, not submarine	641,258	737,660
Wires and cables, paper insulated	543,436	614,129
Ditto, rubber insulated	458,418	273,401
Ditto, cotton, silk or artificial silk insulated	81,577	53,875
Ditto, enamel, glass or asbestos insulated	116,606	60,845
Ditto, other	205,959	82,772
Commercial radio apparatus	414,008	425,927
Domestic radio apparatus	305,970	196,999
Telegraph, telephone and signalling apparatus	1,442,324	1,256,287
Radio loudspeakers	59,083	32,163
Telecommunication components, n.e.s.	446,763	271,508
Other telecommunication apparatus	102,754	57,676
Valves and cathode ray tubes	269,596	199,452
Carbons	36,828	10,184
Lamps, exceeding 24 V	87,923	93,093
Ditto, not exceeding 24 V	37,202	30,357
Flashlight bulbs for photographic and other purposes	3,903	1,386
Other lighting appliances	350,115	327,557
Primary batteries	160,921	63,346
Parts other than carbons	16,847	17,477
Accumulators for motor vehicles	176,025	184,883
Ditto traction	13,848	20,115
Ditto radio	10,201	4,518
Other portable accumulators	120,859	38,827
All other accumulators	35,534	37,919
Parts and accessories	62,147	80,993
Cooking appliances	139,069	66,139
Heating appliances	68,337	57,435
Parts and accessories for cooking and heating appliances	69,791	54,185
Flat irons	50,325	31,423
Commercial electrical instruments	126,933	103,898
House service meters	132,192	90,896
Time recorders and time switches	15,545	13,021
Other electrical instruments	136,455	85,770
Electro-medical apparatus (not X-ray)	54,395	36,125
X-ray apparatus, tubes and parts	128,051	88,167
Permanent magnets	21,657	18,122
Insulating cloth and tape	106,389	73,968
Other insulating materials	86,737	85,094
Unclassified electrical goods and apparatus	370,105	417,905
TOTAL electrical goods and apparatus	7,742,007	6,436,894
Diesel driven generators not exceeding 200 kW*	369,914	1,000,417
Ditto, exceeding 200 kW*	175,924	71,967
Other generating sets*	328,360	221,169
Generators exported without prime movers, and parts of generators†	224,343	143,263
Motors, railway, tramway and trolley bus	20,146	32,970
Ditto, other, not over ¼ h.p.	111,982	57,575
Ditto, over ¼ h.p. but under 1 h.p.	38,587	35,110
Ditto, from 1 h.p. to 250 h.p.	452,416	515,981
Ditto, exceeding 250 h.p.	145,943	54,858
Ditto, parts	74,860	81,324
Converting machinery	14,328	12,611
Transformers, including coils	534,784	650,125
Rectifiers for power house use	77,770	67,056
Motor starting and controlling gear	202,762	203,711
Switchgear and switchboards (not telegraph and telephone)	756,114	1,076,683
TOTAL electrical machinery	3,528,233	4,224,820
Washing machines (not exceeding 250 lb weight)	290,580	245,542
Ditto, parts	23,241	20,882
Vacuum cleaners	205,023	73,610
Ditto, parts	49,136	19,728
Other electrically operated portable appliances and parts	133,301	93,239
Portable electric tools	123,888	91,201
Unspecified electrical machines, machinery and parts	238,329	26,761
GRAND TOTAL	12,333,738	11,232,677

* The 1950 figures include generators without prime movers

† The 1950 figures are for parts of generators only

new heading is "unspecified electrical machines, machinery and parts." Here the substantial total of £238,329 compares with only £26,761 for January, 1950.

Exports of generating plant are now split up into diesel driven (not exceeding 200 kW and above 200 kW) and other types, and it should be noted that the figures for January, 1950, include generators exported without prime movers. Owing to a decline from £1,000,417 to £369,914 in sales of diesel generators not exceeding 200 kW, the total shipments of generators fell from £1,436,816 to £1,098,541. For the first time since the war, we believe, Russia was no longer the largest buyer, its share of the trade at £116,997 comparing with £186,612 for India, and £167,820 for Australia. Overseas business in motors improved from £777,818 to £843,934, but the demand for other electrical machinery declined from £2,010,186 to £1,585,758, South Africa (£358,271) and India (£225,793) being the best customers.

TABLE II.—Distribution of Electrical Goods and Apparatus

Destination	Jan., 1951	Jan., 1950
	£	£
Channel Islands	46,956	43,489
Gibraltar	30,837	2,320
Malta and Gozo	7,583	9,020
Cyprus	23,795	8,181
British West Africa	155,916	135,555
Union of South Africa	725,421	707,017
Northern Rhodesia	17,923	33,689
Southern Rhodesia	146,135	99,256
British East Africa	105,759	128,100
Bahrein, Kuwait, Qatar and Trucial Oman	20,989	43,450
India	659,884	521,879
Pakistan	191,934	64,487
Malaya	259,238	230,784
Ceylon	72,278	53,559
Hong Kong	190,580	144,292
Australia	1,232,180	1,007,243
New Zealand	479,539	402,022
Canada	178,133	51,571
British West Indies	114,868	69,858
Anglo-Egyptian Sudan	28,538	24,358
Other Commonwealth Countries	42,295	74,963
Irish Republic	230,445	214,957
Soviet Union	6,603	14,427
Finland	21,871	30,432
Sweden	201,751	159,824
Norway	99,825	138,272
Iceland	18,335	33,270
Denmark	84,480	71,545
Poland	68,284	23,902
Germany	18,335	23,658
Netherlands	201,381	185,751
Belgium	106,091	73,188
France	122,607	66,891
Switzerland	31,702	41,436
Portugal	29,742	58,145
Spain	53,813	15,655
Italy	85,036	29,025
Austria	21,453	55,330
Hungary	4,555	21,462
Czechoslovakia	14,205	28,909
Greece	39,683	53,119
Turkey	19,023	21,453
Indonesia	24,157	54,414
Portuguese East Africa	9,485	12,417
Syria	19,853	44,049
Lebanon	14,670	42,197
Israel	24,374	18,596
Egypt	156,851	127,727
Arabia	9,757	8,326
Iraq	118,340	60,747
Iran	180,990	115,831
Burma	29,537	86,698
Thailand	27,399	14,952
China	53,885	4,980
United States of America	168,759	30,291
Colombia	14,823	2,748
Venezuela	39,671	47,260
Peru	57,362	32,460
Chile	29,460	39,208
Brazil	271,482	70,776
Uruguay	31,250	16,815
Argentine Republic	130,090	290,016
Other Foreign Countries	119,513	100,642
Total	7,742,007	6,436,894

Shipments of electrical goods and apparatus at £7,742,007 are about £1 million higher than those reported for December and £1,305,113 above the January, 1950, figure. Distribution of the products by countries is given in Table II, Australia being by far the biggest buyer, taking £1,232,180 worth.

Though not quite so good as in December or in January last year, exports of commercial radio apparatus continued at a high level (£414,008) with Sweden (£79,551) the best customer. There was a marked improvement in sales of domestic radio sets from £196,999 to £305,870. Australia took £465,050 worth of the telegraph, etc., exports (£1,442,324).

Both dry batteries and accumulators were much in demand, sales of the former increasing from £63,346 to £160,921 and those of the latter from £286,262 to £356,467, of which India accounted for £91,164 worth. Sales of cooking appliances were doubled, while those of heating appliances rose from £57,435 to £68,337. The market for electrical instruments was also good, exports rising from £293,585 to £411,125.

New Gazetteer

FROM the Electrical Press, Ltd., 23, Great Queen Street, London, W.C.2, we have received a copy of a new "Administrative Gazetteer of Great Britain" (price 30s). This gives areas, populations, rateable values, etc., of all urban and rural administrative districts in England, Scotland and Wales. In each case mention is made of the Electricity Board supplying the area and for a large number of districts names of local electrical contractors are given. The addresses of Electricity Boards and Sub-Areas are given in an appendix.

ELECTRICITY SUPPLY

Merseyside Board's Charges

Power Lines Damaged in Scottish Blizzard

THE Merseyside and North Wales Electricity Consultative Committee, at its meeting at Chester on 22nd February, passed a resolution endorsing a proposal by the Area Board to increase the price of electricity under certain tariffs by 0·1d. per kWh. The Board has issued a statement explaining that the position for the financial year 1951–52 must be reviewed in the light of the increase in the pit-head price of coal and other higher costs. The estimated effect, after allowing for the amount that will be recovered from industrial consumers whose tariff includes a coal price variation clause, will be to increase the Board's costs by £433,000. It is proposed to apply the increase of 0·1d per kWh to tariffs which do not include a coal clause and in which the present price is less than 4d per kWh for lighting and composite flat rates or less than 2d per kWh for power, commercial and domestic purposes. The same increase will be made to prepayment supplies subject to an upper price limit of 4½d and 2½d respectively. The estimated increase in revenue to be derived from this revision is £352,000 for the year.

Shoreham Harbour Scheme

The Shoreham Harbour Trustees have been informed by the British Electricity Authority that it proposes to proceed with the £1½ million harbour development plan. The purpose is to accommodate larger vessels bringing coal for Southwick power station; provision is made for berthing colliers of up to 4,000 tons against the present limit of 1,500 tons. The Minister of Health has also issued his findings resulting from the local inquiry held last year into the new sewerage arrangements necessitated by the harbour proposals. The B.E.A. is to undertake the provision of a sewer in place of part of the existing one.

Motors for Snowy Mountains Project

The Snowy Mountains hydro-electric and irrigation scheme, sponsored by the Commonwealth Government of Australia, is to be provided, in its initial stages, with motors manufactured by Lancashire Dynamo & Crypto, Ltd. Drip-proof, slip ring in type, these motors give 180 h.p. at 975 r.p.m. with a 50 c/s three-phase supply at 415 V and, operating 5,000ft up, will be used to drive the compressors cutting the first tunnel. It is intended that hydro-electricity derived from this tunnel will provide the power for the completion of the whole system of underground waterworks totalling 90 miles in length and including one tunnel 32 miles long and 45 ft in diameter at one end. The Snowy Mountains scheme will eventually comprise 16 power stations with an installed capacity of 3,000,000 kW.

Electricity for N.C.B. Houses

The *Doncaster Chronicle* reports that work is expected to begin this month on the installation of electricity in 1,268 houses at Rossington which were taken over by the National Coal Board on nationalization. About 80 per cent of the inhabitants have agreed to the scheme. The tenants will pay an additional shilling a week rent, which will cover maintenance.

Distribution Improvements

It is reported in the *South Wales Evening Post* that cable-laying now in progress in the town centre at Neath is part of a £250,000 scheme for improving and extending electricity supplies in the borough and rural district during the next two years. The existing two-phase system is to be converted to three-phase and new cables laid throughout the greater part of the built-up areas of Neath, Briton Ferry and Skewen. Work has already begun on the provision of two h.v. lines between Tir John power station and the National Oil Refineries to afford increased supplies in connection with the developments at the refineries.

Storm Damage in Scotland

Ice up to 1ft in thickness formed on the main power lines from the Fannich Scheme to the Scottish East Coast during a blizzard—described as the worst of the winter—which broke over Northern and Central Scotland on Saturday, 17th February. Linesmen were still at work repairing the havoc caused by the storm on the following Tuesday night.

The trouble began with a fault on the distribution line to Kinlochleven at Rannoch. A Crieff district linesman and his mate who were sent to repair the fault were not heard of again until late on Sunday when they were reported safe in the Kingshouse Hotel. Later in the evening, the East Grampian line from Tummel Bridge over the Alyth Moor to Forfar broke down, causing a blackout in Alyth, Blairgowrie, Pitlochry and neighbourhood. The Pitlochry

supply was restored by taking power direct from the Tummel-Garry scheme. To restore the supply to Blairgowrie and Alyth, power was eventually fed back to Lunanhead and through the East Forfar lines at Alyth. On the west coast, Oban was blacked out when the wind blew down two transmission lines near Bridge of Orchy. Linesmen from the Board's Oban office with men from Balfour, Beatty & Co., Ltd., worked throughout the night and restored the supply to Oban at 1 p.m. on Sunday. Another line in the west, from Clachan at the head of Loch Fyne to Dalmally, was also put out of action. Frozen snow and ice which weighed down a 700ft span of the 33 kV transmission line from the Tummel Valley stations to Speyside so that it became entangled in a treetop at Trinafour, caused a blackout at Kingussie and Newtonmore. Power was restored in about twenty minutes by altering the route of the supply. The main Dingwall-Newmore line which carries the entire load for the north was twice put out of action by the storm, supplies being restored by feeding the power over a low voltage line to Newmore and stepping it up again to its normal transmission voltage.

Overhead Line Objection

The Edinburgh Planning Committee is to ask city and county M.P.s to raise with the Ministry of Fuel and Power the question of the proposed erection by the South East Scotland Electricity Board of an overhead line to Lady Victoria Colliery, Newtongrange. At a meeting of the Committee on 21st February a letter was read from the Ministry which stated that careful consideration had been given to the Corporation's views before consent had been given for the erection of the overhead line, and the Ministry could not consider any further representations on the matter.

New Belfast Station

At a special meeting of Belfast City Council on 15th February the scheme for building the new Victoria power station on the Co. Antrim side of the harbour at a cost of £4,215,750 was approved. The present station on the County Down side has a capacity of 144 MW and that of the Victoria station will be 60 MW. The chairman of the Electricity Committee (Alderman W. H. Cooper) said that further capacity would be necessary for the winter of 1955–56 and experts were in Ulster at that moment to consider whether the Victoria station should be extended or another power station established outside Belfast.

Control of Water Power in Manitoba

The Manitoba Government announces that it will seek "a substantial measure of control" over hydro-electric generating facilities in the province. The plan for dealing with a developing power shortage was outlined in the Speech from the Throne read by Lt. Gov. R. F. McWilliams at the opening of the Legislature. The speech indicated that the Government will seek authority either to expropriate the Winnipeg Electric Company's generating facilities or to bring the company into a voluntary or compulsory pool with Winnipeg's municipally-owned City Hydro and the Manitoba Power Commission.

Record Canadian Output

Production of electrical energy by Canada's central electric stations reached a record total of 50,795·3 million kWh in 1950, reports the Bureau of Statistics. All provinces shared in the increase, almost 9 per cent over the previous year's total of 46,673·2 million kWh. Net exports to the United States rose to 1,924·4 million kWh in 1950 from 1,730·7 million in the previous year. The two biggest producers were Quebec and Ontario. Quebec's output rose from 25,612·6 million kWh in 1949 to 27,475·6 million kWh in 1950, and that of Ontario from 12,166·0 million to 13,437·4 million kWh.

Substation Sites

Durham County Boroughs Committee has further considered the leasing of sites to the North Eastern Electricity Board for proposed substations. It is proposed that the Board shall pay 4 per cent interest on the developed value of the site. The length of access road to the site in respect of which the Board would be required to pay interest is to be the subject of a compromise. Each local authority will settle with the Board the question of fencing the roadway if needed and it has been agreed that the basic designs of substations shall be discussed between the Board and the local authorities.

Street Lighting

Ninety electric street lamps are to be installed on the Ellen Wilkinson housing estate, Felling-on-Tyne. The cost will be about £2,000.

Appleby Council has asked the North Western Electricity Board for an estimate of the cost of installing street lighting in Boroughgate.

Carlisle City Council has approved a £1,500 scheme for installing fluorescent street lighting in part of English Street.

"All Electric" Houses

Markinch Town Council has approved the adoption of an all-electric policy for its new scheme at Sweetbank. Tenants will be responsible for maintenance after one year.

Floor Heating

Fife County Council is to consider the installation of electrical floor heating in the new county building. Officials from Cupar saw the system in use in the West of Scotland and reported on its operation at a recent meeting.

RECENT INTRODUCTIONS

NOTES ON NEW ELECTRICAL AND ALLIED PRODUCTS

Fence Insulators

THE new Wolseley "Butterfly" polythene insulator for electric fences is claimed to be unbreakable; it can be simply nailed or screwed to any wooden or metal post. The "creep length" (the distance between the live wire and the nail or clip holding the insulator) is stated to be much longer than that of any other insulator on the market. The price is 4s per dozen and the manufacturers are the WOLSELEY SHEEP SHEARING MACHINE CO., LTD., Wolseley Works, Electric Avenue, Witton, Birmingham, 6.

Under-Bed Heater

The "Arega Comfiheater" made by PRECISION-ELECTRIC, LTD., 21–23, St. Paul's Square, Birmingham, 3, is designed for suspension under the bed by adjustable non-conductive cords. It consists of a 4ft 10in length of rectangular tube (3in by $\frac{3}{4}$in section) housing a 60 W or 80 W per ft element. One of the end-caps on the tube is removable for access to the wiring. The price is £1 18s 8d (plus £1 8s P.T. in this country).

Variations of the heater include floor and wall types, a 2 kW portable model on castors, a duplex unit (400 W or 100 W optional loading) with metal mesh (for drying cabinets) or sheet metal cover, a towel dryer and a de-mister for shop windows.

Modern Lighting Units

Adaptation of the technique employed for storing instruments, etc., in "cocoon" form offers interesting possibilities for achieving novel illumination effects. The range of "Starlight" fittings now being distributed by E.T.D., LTD., 2, Greenland Place, London, N.W.1, is produced by spraying a thermoplastic material called "Chrysaline" on to a wire framework. The resulting lampshades are seamless, non-inflammable, washable, impervious to water, elastic and shadowless and harmonize well with modern furniture and furnishings.

Models are made in a variety of colours, with a nylon flocking to give colour contrast in some cases. In addition to lighting units for normal purposes, designs in the form of animals, birds, etc., are being produced specially for use in connection with the Festival of Britain.

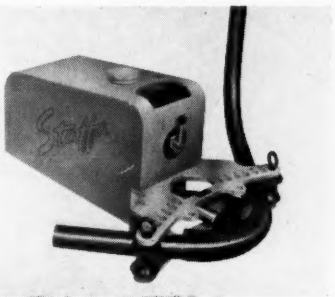
Bending Machine

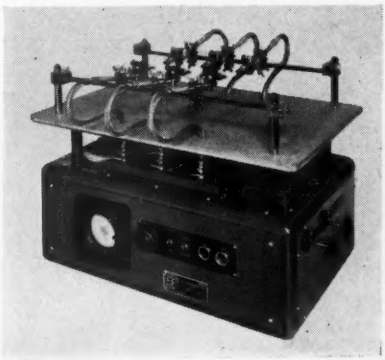
The redesigned 2in hydraulic tube bending machine (illus.) offered by CHAMBERLAIN INDUSTRIES, LTD., Staffa Road, London, E.10, is completely self-contained and driven by a 0·5 h.p. motor.

Electro-Gas Heating

The electro-gas equipment introduced by STANDARD TELEPHONES & CABLES, LTD., Footscray, Sidcup, Kent, provides quick localized heating for soldering, brazing, annealing and hardening, combining the advantages of the flexibility and low cost of gas with the exact control and precision provided by electrical apparatus. It comprises an array of burners operating on coal-gas and compressed air and an associated electrical control unit with

Right: "Stanelco" electro-gas heating equipment
Below: Tube bending machine (Chamberlain Industries)





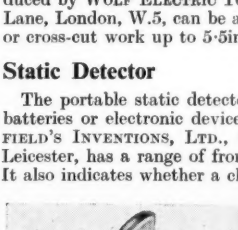
a push-button on-off switch and an automatic process timer. With it, unskilled personnel can perform precision heating operations of the most delicate nature in the production line, since once it has been correctly set up the heating cycle is controlled automatically. Any number of burners up to 30 can operate from a single unit.

Portable Electric Saw

The 10in portable electric saw (illus.) introduced by WOLF ELECTRIC TOOLS, LTD., Hanger Lane, London, W.5, can be adjusted for ripping or cross-cut work up to 5·5in wide.

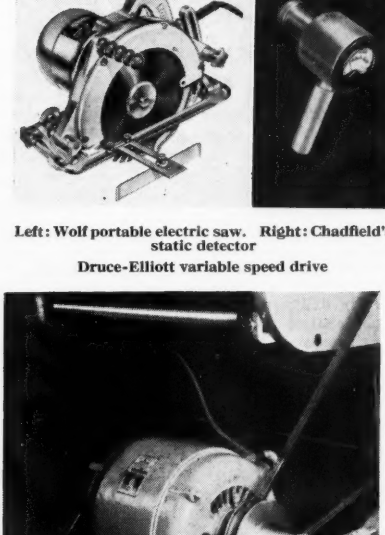
Static Detector

The portable static detector, without valves, batteries or electronic devices, made by CHADFIELD'S INVENTIONS, LTD., 65, Henton Road, Leicester, has a range of from 50 V to 100 kV. It also indicates whether a charge is positive or negative and will measure currents as low as 10^{-17}A, so that it can be used as an ionization meter or insulation tester.



Left: Wolf portable electric saw. Right: Chadfield's static detector

Druce-Elliott variable speed drive



Variable Speed Drive

The improved Druce-Elliott variable speed drive (illus.) marketed by the PACKAGE SEALING CO., LTD., Essex Road, London, W.3, works on the expanding pulley principle and is suitable for all motors of up to 10 h.p.

Isolator

An a.c. 500 V, 50 A isolator (illus.) introduced by J. A. CRABTREE & CO., LTD., Lincoln Works, Walsall, is normally supplied as a four-pole unit, although three- and five-pole types are available.

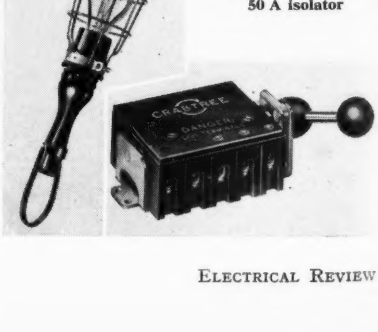
Handlamp

An improved " New Navy " handlamp (illus.) is available from the BRITISH CENTRAL ELECTRICAL CO., LTD., 6 and 8, Rosebery Avenue, London, E.C.1, price 10s.

Personal Attack Alarm

The latest " Tocsin " alarm for banks, shops, etc., introduced by MADEWEL PRODUCTS, LTD., 4, North Parade, Sale, Manchester, is completely self-contained, either mains or battery operated, and can be supplied with operating bars up to 6ft long.

" Tocsin " personal attack alarm



Left: B.C.E. handlamp. Below: Crabtree 500 V, 50 A isolator

NEXT WEEK'S EVENTS

Monday, 5th March

BIRMINGHAM.—James Watt Memorial Institute, Great Charles Street, 6 p.m. I.E.E. South Midland Centre. Discussion on "Engineering—Financial Problems arising in the Electricity Supply Industry," opened by D. H. Kendon.

ILFORD.—Angel Hotel, 8 p.m. A.S.E.E. North East London Branch. "Electrical Suppression of Interference," by G. L. Stephens.

LEEDS.—Lighting Service Bureau, 24, Aire Street, 7 p.m. I.E.S. Leeds Centre. "The Lighting of Departmental Stores," by A. W. Jervis.

LIVERPOOL.—At the Royal Institution, Colquitt Street, 6.30 p.m. I.E.E. Mersey & North Wales Centre. "Mechanical Handling," by A. Roebuck, H. S. Carnegie and E. G. Taylor.

LONDON.—Savoy Place, W.C.2, 6 p.m. I.E.E. Education Discussion Circle. Discussion on "The Best Means of Explaining the Internal Operation of Electronic Valves," opened by A. F. H. Thomson.

At the Geological Society, Burlington House, W, 5.30 p.m. Society of Engineers. "Metallic Arc Welding," by B. W. Silverwood.

MAIDSTONE.—New Inn, Sandling Road, 7.30 p.m. I.E.E. District meeting. "Polyphase Commutator Motors," by J. W. Hibbert.

NEWCASTLE-ON-TYNE.—King's College, 6.15 p.m. I.E.E. North-Eastern Radio and Measurements Group. Informal lecture on "The Nervous System as a Communication Network," by J. A. V. Bates.

SHEFFIELD.—Royal Victoria Hotel, 7.30 p.m. A.S.E.E. Sheffield Branch. "Electricity in the Brewing Industry," by S. Biggin.

Tuesday, 6th March

CAMBRIDGE.—Cavendish Laboratory, 8.15 p.m. I.E.E. Cambridge Radio Group. Discussion on "Is there an Optimum Speed for a Gramophone Record?" opened by Dr. G. F. Dutton.

COVENTRY.—E.M.E.B. Sandy Lane Works, 7 p.m. E.P.E.A. Midland Technical Group. "The History and Development of Paper Cables," by J. Temple Hazell.

DERBY.—E.M.E.B. Service Centre, 6.30 p.m. I.E.E. East Midland Centre. "Electrical Installations in Large Chemical Factories," by D. B. Hogg.

HAMMERSMITH.—Town Hall, 7.30 p.m. A.S.E.E. West London Branch. "Power Plant Installations," by W. F. Parker.

LEEDS.—B.E.A. 1, Whitehall Road, 6.30 p.m. I.E.E. North Midland Centre. "The Performance of the British Grid System in Thunderstorms," by Dr. J. S. Forrest.

LONDON.—At the Institution of Electrical Engineers, Savoy Place, W.C.2, 5 p.m. Institution of Post Office Electrical Engineers. "The Provision and Maintenance of Long Distance Circuits, London Trunk Transmission Control," by E. H. Jeynes and J. E. Isherwood.

Olympia. *Daily Mail* Ideal Home Exhibition (continued until 31st March).

MANCHESTER.—Midland Hotel, 6.45 for 7.15 p.m. I.E.E. North-Western Centre. Annual dinner.

Wednesday, 7th March

ABERDEEN.—Caledonian Hotel, 7.30 p.m. I.E.E. North-East Scotland Sub-Centre. "The Control of Hydro-Electric Plant," by A. C. H. Frost and W. Brittlebank.

LONDON.—Savoy Place, W.C.2, 5.30 p.m. I.E.E. Radio Section. "Design Considerations for a Radiotelegraph Receiving System," by J. D. Holland.

NEWCASTLE-ON-TYNE.—Minor Durrant Hall, Oxford Street, 6.15 p.m. I.E.S. Newcastle Centre. "The Design of Lighting Fittings," by W. R. Stevens.

PORTSMOUTH.—B.E.A. House, 6.30 p.m. I.E.E. Southern Centre. "An Organization for Internal Standardization in a Large Manufacturing Company," by P. J. Daglish.

STOKE-ON-TRENT.—M.E.B. Back Glebe Street, 7 p.m. E.P.E.A. Midland Technical Group. "Electric Kilns," by Dr. W. L. German.

YORK.—Royal Station Hotel, 8 p.m. A.S.E.E. York Branch. "The Electrical Loading of a Fabrication Shop," by J. J. Skeldon.

Thursday, 8th March

DUNDEE.—Royal Hotel, Union Street, 7 p.m. I.E.E. North-East Scotland Sub-Centre. "The Control of Hydro-Electric Plant," by A. C. H. Frost and W. Brittlebank.

DUNFERMLINE.—Unitas Hall, Queen Anne Street, 7 p.m. Dunfermline & District Electrical Society. "Post Office Automatic Systems," by J. T. McLoughlin.

LEICESTER.—E.M.E.B. Charles Street, 6.30 p.m. I.E.S. Leicester Centre. "Hospital Lighting," by M. W. Peirce and D. J. Reed.

LONDON.—35, Grosvenor Place, S.W.1, 7 p.m. Association of Electrical Housecraft Advisors. Annual general meeting.

SOUTHAMPTON.— Polygon Hotel, 7.30 p.m. I.E.E. Southern Centre. Annual dinner and visit of the President.

SWANSEA.—Plaza Cinema, 6 p.m. I.E.E. West Wales (Swansea) Sub-Centre. Informal meeting. Three short papers.

TREFOREST.—School of Mines, 5.45 p.m. I.E.S. Cardiff Centre. "The Problems Associated with Underground Lighting in British Coal Mines," by D. A. Strachan.

Friday, 9th March

BELFAST.—Grand Central Hotel, 8.30 p.m. I.E.E. Northern Ireland Centre. Annual Conversazione.

BIRMINGHAM.—New Inns Hotel, Handsworth. Electrical Trades Commercial Travellers' Association, Birmingham & District Branch. Annual dinner-dance.

Imperial Hotel, 6 p.m. I.E.S. Birmingham Centre. Annual general meeting. "Light and Vision," by H. C. Weston.

LIVERPOOL.—Reece's Restaurant, Parker Street, 6.30 p.m. I.E.E. Mersey & North Wales Centre. Dinner dance.

(*Continued at foot of next page*)

NEW BOOKS

Industrial Electrical Plant Maintenance. By E. G. Anness. Pp. 191; figs. 88; index. Sir Isaac Pitman & Sons, Ltd., Parker Street, Kingsway, London, W.C.2. Price 27s 6d.

This book has been specially written for the maintenance engineer in charge of electrical power plant. Its purpose is to inform the reader of the care necessary to keep the plant in efficient operation, and to enable him to diagnose the probable causes of troubles which may be experienced.

The main subjects are d.c. and a.c. motors and their control gear, but notes are also given on capacitors and transformers. The work is exceptionally well illustrated by photographs and diagrams. It can be recommended to every engineer concerned with the care of electrical plant, if only on account of the excellent treatment given to troubles which may occur at commutators and ball and roller bearings, and the charts which deal with common troubles on brushgear, d.c. motors and generators, three-phase induction motors, ball and roller bearings, and transformers.

If there is a fault with the book it is that the author has attempted to cover rather too big a subject in a book of this size. In consequence the notes on actual safe loads and temperatures, certain types of single-phase motors, settings and maintenance of protective gear have had to be rather brief. To some extent lack of detail has been compensated for by the references to relevant British Standard Specifications. Perhaps it may be possible in a future edition to give more details of inspection routines, commutation tests, and defects which can give so much trouble on single-phase motors.—J. L. W.

How to Write Technical Books. By John Gloag. Pp. 164, plus index; 4 plates; line drawings. George Allen & Unwin, Ltd., Museum Street, London, W.C.1. Price 12s 6d.

Much useful advice is here given in remarkably small compass, not only to intending authors of books, but also to those who write articles for the technical Press, papers for institutions, or even ordinary reports. The information presented should enable an author to understand the practical needs and economic possibilities of publishing and printing, thus expediting production as well as reducing its cost. Included are notes on proof correcting (in accordance with B.S. 1219), typography, blocks, indexing, varieties of paper and quick estimation of space.

The great importance of brevity, which usually accompanies clarity of expression and requires considerable thought, is emphasized throughout. Brevity reduces the time and effort of possibly reluctant readers and also saves paper, economy in which means as much to editors and publishers as economy in coal does to power station engineers. Mr. Gloag practises what he preaches.—C. O. B.

Next Week's Events (*Contd. from p. 459*)

Friday, 9th March (*Contd.*)

LONDON.—Savoy Place, W.C.2, 6.45 for 7.15 p.m. I.E.E. London Students' Section. Annual dinner.

39, Victoria Street, S.W.1, 6.30 p.m. Junior Institution of Engineers. "Glass, Light and Designs," by S. L. Lyons.

St. Ermins Hotel, S.W.1. Institute of Industrial Administration. Conference of directors and managers (continued until 11th March).

MANCHESTER.—Grand Hotel. Manchester Association of Engineers. Dinner and dance.

NOTTINGHAM.—Victoria Station Hotel, 6.45 for 7.15 p.m. I.E.E. East Midland Centre. Annual dinner and visit of the President.

Saturday, 10th March

LONDON.—I.E.E. London Students' Section, 10.30 a.m. Visit to E.M.I. Studios, Abbey Road, N.W.8.

Books Received

The Nomogram. By H. J. Allcock, M.Sc. (Wales), M.I.E.E., M.I.Mech.E., and J. R. Jones, M.A., F.G.S. Fourth edition revised by J. G. L. Michel, M.Sc., A.I.A. Pp. 238; figs. 81, index. Sir Isaac Pitman & Sons, Ltd., Parker Street, Kingsway, London, W.C.2. Price 18s.

Wireless Servicing Manual. By W. T. Cocking, A.M.I.E.E. Eighth edition. Pp. 296; figs. and index. Published for *Wireless World* by Iliffe & Sons, Ltd., Dorset House, Stamford Street, London, S.E.1. Price 12s 6d.

"Mechanical World" Electrical Year Book 1951. Pp. 357; figs.; index. Emmott & Co., Ltd., 21, Bedford Street, London, W.C.2. Price 3s.

FINANCIAL SECTION

Company Notes and Stock Exchange Activities

Reports and Dividends

The **English Electric Co., Ltd.**, reports a trading profit for 1950 of £3,233,139, as compared with £2,110,647 for 1949, and after deducting depreciation £595,694, taxation £1,595,000 (including £605,000 transferred to reserve for estimated future tax on the profits of the year), and adding dividends from subsidiaries and from trade investments, there is a net balance of £928,566 (against £636,571), to which is added £272,332 brought in, making £1,200,898. The final ordinary dividend is 11 per cent (against 6 per cent), making 15 per cent, less tax, for the year (against 10 per cent), general reserve receives £500,000 and £288,752 is carried forward. The consolidated accounts show a profit of £1,101,022, of which £1,049,892 is applicable to the English Electric Co.

Marconi's Wireless Telegraph Co., Ltd., reports a trading profit for the year ended 30th December last of £259,213, as compared with £237,815 for the preceding year, and a net profit of £154,539 (against £140,483), which with £119,032 brought in, makes £273,571. The ordinary dividend for the year is unchanged at 7 per cent and £186,171 is carried forward.

The Marconi International Marine Communication Co., Ltd., reports a profit for 1950, including wholly-owned English subsidiaries, of £111,702, after deducting £160,000 for United Kingdom taxation, £295,329 for depreciation, and transferring £38,500 to depreciation equalization reserve. It is proposed to pay a final ordinary dividend of 7½ per cent (against 5 per cent), making 10 per cent for the year (against 7½ per cent).

D. Napier & Son, Ltd. (controlled by the English Electric Co.), reports a profit for 1950, after all charges, of £68,413 (against £55,343 for 1949). The ordinary dividend for the year is maintained at 7½ per cent.

R. A. Lister & Co., Ltd.—The annual meeting was held on 19th February. In the absence of Sir Percy Lister (chairman), who was indisposed, his statement was read by Mr. F. H. Lister. In this the chairman said that the demand for their products, both from the home and overseas markets, was greater than ever, and despite increased output the demand still remained considerably in excess of production. Not only had a satisfactory percentage of the turnover during the year under review been secured from the dollar markets, but over 25 per cent of their outstanding orders emanated from the Western Hemisphere. Their Australian subsidiary continued its expansion in an encouraging manner.

Hoover, Ltd., reports group profits for 1950 of £2,475,271, as compared with £1,719,378, and after deducting United Kingdom tax, there is a balance of £1,071,081 (£849,129). The interim ordinary dividend was 15 per cent (against 10 per cent) on the old capital, and it is now proposed to pay a final dividend of 22½ per cent on capital doubled by a scrip bonus. The final dividend for 1949 was 35 per cent. It is also proposed to pay 2s 1.0065d per 1s "A" ordinary share, held by or on behalf of employees, also on a doubled capital.

Mather & Platt, Ltd., show a net profit of £360,540 for 1950 (£288,267 for 1949). The balance is struck after providing £100,000 for stock-in-trade contingency reserve. It is proposed to pay a final dividend of 6 per cent, and a jubilee bonus of 2½ per cent, both less tax on the ordinary capital as increased by the 50 per cent bonus last June. The bonus shares did not rank for the interim dividend paid last September. For 1949 the total distribution was 11 per cent.

A. H. Hunt, Ltd., report a profit for 1950, after all charges, including tax, of £55,917, as compared with £22,564. Provision for future tax absorbs £13,700, and it is proposed to pay a final ordinary dividend of 17½ per cent (against 15 per cent), making 25 per cent for the year (against 22½ per cent). The balance carried forward is £40,198 (against £15,168 brought in).

Scophony-Baird, Ltd.—In an interim report Lt.-Gen. Sir Charles J. S. King (chairman), states that preliminary estimates show a trading loss between 1st April and 30th September last of £58,000, in addition to which it now seems clear that it will be necessary in due course to write down certain items of stock and work in progress to a considerable extent. It is therefore doubtful whether final results will show any improvement on those for last year. The cash position has now been improved by the sale of the Wells factory on a satisfactory basis. The

economies to reduce losses foreshadowed at the annual meeting have been made, although these will take some time to reach their full effect.

The Electrolytic Zinc Co. of Australasia has declared an interim dividend of 10 per cent (against 7 per cent).

Thorn Electrical Industries, Ltd.—It is announced that the offer of 352,500 new 5s ordinary shares at 15s 6d has been accepted by shareholders to the extent of 98.3 per cent.

New Companies

James Priddy, Ltd.—Registered 15th February. Capital £3,000. To acquire the business of an electrical contractor, radio and sports dealer, etc., carried on by J. Priddy at Weston-super-Mare. J. Priddy is permanent managing director. Regd. office : 48, Regent Street, Weston-super-Mare.

Hughes & Lucas, Ltd.—Registered 15th February. Capital £2,000. Electricians, mechanical engineers and manufacturers and repairers of and workers and dealers in electrical apparatus and goods, etc. Directors : C. A. Hughes and D. Lucas. Regd. office : 49, Russell Street, Kettering, Northants.

Rola Celestion, Ltd.—Registered 20th February. Capital £1,000. Objects : Manufacturers of and dealers in electro-acoustical, acoustical and sound producing articles, apparatus and equipment of all kinds, etc. Other particulars as for Truvox Holdings, Ltd.

E. Dawson (Branches) Ltd.—Registered 17th February. Capital £8,000. Wholesale suppliers of all classes of electrical apparatus, electrical engineers, manufacturers and repairers, etc. Directors : C. H. Blackburn, A. H. Body, W. Taylor and A. S. Wraight. Regd. office : 1, Lincoln's Inn Fields, W.C.2.

Howson's Neon Signs, Ltd.—Registered 19th February. Capital £2,000. Manufacturers and repairers of and dealers in neon and electric and other signs of all kinds, etc. Directors : H. Howson and Alice Howson. Regd. office : 392, Glossop Road, Sheffield, 10.

Bartlett Trust Electrical, Ltd.—Registered 19th February. Capital £100. Electricians and electrical, mechanical and general engineers and contractors, etc. Directors : E. R. B. Graham and H. D. H. Bartlett. Regd. office : 54, Victoria Street, S.W.1.

Truvox Holdings, Ltd.—Registered 20th February. Capital £1,000. Manufacturers of and dealers in electro-acoustical, acoustical and sound producing articles, apparatus and equipment, television, electrical and wireless apparatus and accessories, etc. Subscribers : G. K. Ireland and L. Cork. Solicitors : Herbert Oppenheimer and Co., 20, Copthall avenue, E.C.2.

Truvox, Ltd.—Registered 20th February. Capital £1,000. Objects and other particulars similar to Truvox Holdings, Ltd. (q.v.).

Increase of Capital

Wolf Electric Tools, Ltd.—Increased by £43,400, in 868,000 " B " shares of 1s each, beyond the registered capital of £110,000.

Meeting of Creditors

C.V.P. Electrical, Ltd.—Meeting of creditors at Feakins English Co., 211, Lower Addiscombe Road, Croydon, Surrey, on 19th March.

Receiver Appointed

Parbruk, Ltd.—W. S. Wicks, of 3, Cook Street, Liverpool, was appointed receiver and manager on 6th February, 1951, under powers contained in charge dated 24th May, 1950.

Liquidation

Corwen Electric Light Co., Ltd.—Mr. C. L. Morris, Caxton House, Corwen, Merioneth, liquidator, appointed 30th January. Particulars of claims to the liquidator by 12th March.

Bankruptcies

H. H. Baron, 84, Duckworth Street, Darwen, Lancs, electrician.—Last day for receiving proofs for dividend 6th March. Trustee, Mr. F. C. Ormrod, 20, Byrom Street, Manchester, 3.

E. W. Chapman, London House, King Street, Market Rasen, Lincs, electrical engineer.—Last day for receiving proofs for dividend 5th March. Trustee, Mr. R. Taylor, 150, High Street, Scunthorpe, Lincs.

Instrument Symbols

THE system of instrument symbols described in B.S. 1646 has been devised for graphical representation in engineering and process-line diagrams, industrial reports and plant layout drawings. The symbols are not primarily intended for use in electrical wiring diagrams, nor to detail any particular type of instrument; they do however enable any combination of instruments, or control equipment, to be shown in conjunction with those parts of the plant with which they are associated. The notation used with the symbols, which indicates the kinds of instruments and controls represented, should be supplemented by more detailed instrument lists. Copies are obtainable from the British Standards Institution, 24, Victoria Street, London, S.W.1, price 2s 6d post free.

STOCKS and SHARES

THE trend of Stock Exchange markets at the present time is in favour of ordinary shares and against securities of a purely gilt-edged order. Sales of British Government and similar stocks daily considerably exceed the purchases, and the money realized is diverted, as a rule, into what are still called equity shares. The reason is simply that the value of money, as money, automatically deteriorates as the prices of commodities rise and, with little or no expectation of any improvement in the situation as regards the cost of living, it is not altogether surprising that holders of gilt-edged stocks find it increasingly difficult to live on the income which those provide. Concurrently with the rise in living costs there has come a relaxation of the restriction-of-dividends policy, and, as most of the well established companies are now doing exceedingly well, the anticipation of modest dividend increases serves to favour the employment of money in such issues. Business is, consequently, fairly active in most markets, and the excellence of the English Electric results has drawn fresh attention to the group in which this company is one of the leaders.

English Electric Dividend

An immediate rise of about 10s in the price of English Electric £1 ordinary, to 63s, seemed to do no less than justice to the company's declaration of a 15 per cent dividend, and to the accompanying statement of a more than 50 per cent rise in the group's net profit. The announcement came on the day following the transatlantic flight of the company's "Canberra" jet bomber. In raising the dividend from 10 per cent, the directors are making the first change in the rate since 1937. They state that, thanks to the development in recent years of the manufacturing facilities, both output and earnings from the normal business are amply sufficient to support this rate in ordinary trading conditions in the foreseeable future. At the present price of the shares, the new rate gives a yield of a little over 4¾ per cent. The news stimulated the rest of the market concerned.

Month's Rises

Movements in prices during the month of February, as regards those quoted on the next page, are mainly upwards, there being ten times as many advances as declines. Some of the former are substantial, English Electrics, of course, being notable with a gain of 11s 3d on the month, and Marconi Marines being 7s 6d up at 32s 6d. Another considerable improvement is that in Cable & Wireless ordinary, 15 points higher at 112½. Chloride, General Electric, Johnson & Phillips, Parsons, Electric Construction and Lancashire Dynamo, it will be noticed are all well up on the month. Perak Hydro-Electric put on 3s 6d in response to the better news from Malaya. Radio shares are generally better, including Decca and Pye.

Equipment and Manufacturing

Signs of slackening in the flow of capital from former steel shares into other industrials have been accompanied by evidence of more selectivity in the process. It is notable that discrimination continues to be exercised largely in favour of shares connected with interesting dividend prospects during the next month or two. Thus, Associated Electrical Industries have changed hands up to 88s 3d, the highest price recorded since 1947. After reacting moderately, they still show, on the basis of last year's payment, a yield of less than 3½ per cent, which is well under the return from War Loan. Ericssons at 46s 6d are also, and for similar reasons, around their highest for three years, if allowance is made for the scrip bonus.

Market Notes

Mather & Platt £1 ordinary at 43s 9d were unchanged on the preliminary profits statement, and the declaration of a 6 per cent final dividend, plus 2½ per cent as a jubilee bonus. These, with the interim, make a total of 12½ per cent for the year on capital increased by 50 per cent since the previous total of 11 per cent. Since the interim was payable only on the smaller capital and in view of the special nature of the bonus, the dividend basis for yield calculation is not firm: on the above total, it works out at nearly 5¾ per cent. Shares on offer in moderate lines include Laurence, Scott 5s ordinary at 15s to yield £4 3s 4d per cent on last year's 12½ per cent dividend: this was covered more than four times by 1949 earnings, and was declared last time in April. Crompton Parkinson 5s "A" ordinary are available at 12s 9d, giving a prospective yield of £4 8s 3d per cent.

Recent Issues

Enfield Cables new 4 per cent debentures remain at a small premium on the issue price of 100, and Pye 5 per cent new preference shares, offered at 20s 9d, stand at about that figure, after dropping a little below it. Northern Ireland Electricity 3½ per cents have followed the trend of the gilt-edged market in depreciating to a discount of 1½ points. Electrical Components 5½ per cent preference stand about the issue price of 21s. Thorn Electrical 5s ordinary, offered at 15s 6d, are now 18s 9d, and show a prospective yield of 5·3 per cent on the company's forecast of a 10 per cent payment after the 100 per cent capital bonus has been distributed.

Electrical Investments

Past Month's Price Changes

Company	Dividend Previous	Dividend Last	Middle Price Feb. 23 1951	Month's Rise or Fall	Yield p.c. £ s. d.
Overseas Electricity Companies					
Atlas Elec. ..	2½	3	18/-	+9d	3 6 8
Calcutta Elec. ..	6†	6†	23/6	−6d	5 2 2†
Cawnpore Elec. ..	—	—	28/9	—	Nil
East African Power	7	7	38/9	+⅛	3 12 3
Jerusalem Elec. ..	—	—	13/-	—	Nil
Madras Elec. ..	—	—	33/9	−⅛	Nil
Nigerian Elec. ..	10	10	30/9	—	6 10 1
Palestine Elec. "A"	5†	5†	21/6	—	4 13 0†
Perak Hydro-Elec.	Nil	Nil	12/6	+3/6	Nil
Whitehall Inv. Pref.	6	6	23/6	—	5 4 4
Equipment and Manufacturing					
Aberdare Cables(5/-)	15	20	14/3	+6d	7 1 7
Aron Elec. Ord. ..	15	15	38/9	—	7 14 0
Assoc. Elec. Ord.	15	15	89/-	+4/-	3 7 3
AutomaticTel.& El.	12½	12½	63/-	—	3 19 4
Babcock & Wilcox	15	15	69/6	+1/9	4 6 2
Baldwin, H. J. (2/-)	25	25	5/9	—	8 14 0
British Aluminium	10	10	42/-	—	4 10 9
B.I. Callender's ..	6¾	6¾	36/-	+2/-	3 14 1
British Thermostat (5/-)	25	30	31/3	+⅛	4 16 0
British Vac.Cleaner (5/-)	20	20	11/-	+1/9	9 1 10
Brush Ord. (5/-) ..	10	10	7/-	+3d	7 2 10
Burco (5/-) ..	35	42½	23/9	−9d	8 17 0
Chloride El. Storage	20	12½*	62/6	+5/-	3 3 9‡
Cole, E. K. (5/-) ..	20	20	20/-	—	5 0 0
Cossor, A. C. (5/-)	Nil	Nil	12/6	+⅛	Nil
Crabtree (10/-) ..	17½	17½	39/-	—	4 9 9
Crompton Parkinson Ord. (5/-) ..	22½	11½*	12/-	—	4 13 9
De La Rue (5/-) ..	50	50	26/3	−9d	9 10 6
Decca (1/-) ..	112½	112½	17/-	+2/-	6 12 5
E.M.I. (10/-) ..	8	8	20/-	—	4 0 0
Electrical Components (5/-) ..	20	20	11/3	—	8 17 10
Elec. Construction	12½	15	64/-	+2/9	4 13 9
Enfield Cable Ord.	7½	7½	33/6	+6d	4 9 7
English Electric ..	10	15	62/6	+11/3	4 16 0
Ericsson Tel. (5/-)	20†	20†	46/3	+1/6	—
Ever Ready (5/-)	40	35	30/-	+1/-	5 16 8
Falk Stadelmann	15	15	41/3	—	7 5 8
G.E.C. Ord. ..	17½	17½	86/3	+⅛	4 1 2
General Cables (5/-)	38	30*	17/6	—	6 11 6
Greenwood & Batley	15	15	51/3	—	5 17 0
Hackbridge Cable (5/-)	—	20	14/6	—	6 18 0
HackbridgeHewittic (5/-)	12½	15	16/-	+6d	4 13 9
Hall Tel. Acc. (10/-)	10	10	16/6	+6d	6 1 3
Heatrae (2/-) ..	12½	12½	4/-	—	6 5 0
Henleys (5/-) ..	20	20	25/-	+6d	4 0 0
Hoover (5/-) ..	45	30*	28/3	+1/-	5 6 2
Intl. Combustion (5/-)	37½	21*	18/3	+3d	4 2 4‡
Johnson & Phillips	15	15	65/-	+½	4 12 4

Company	Dividend Previous	Dividend Last	Middle Price Feb. 23 1951	Month's Rise or Fall	Yield p.c. £ s. d.
Equipment and Manufacturing (continued)					
Lancashire Dynamo	22½	22½	100/9	+4/6	4 9 10
Laurence,Scott(5/-)	12½	12½	14/3	+1/-	4 7 9
London Elec. Wire	10	10	48/3	+2/3	4 3 0
J. Lucas	17½	6¾*	35/-	−½	3 16 4
Mather & Platt ..	11	11	44/6	+9d	—
Metal Industries ..	10	10	44/6	+⅛	4 10 0
Mid. Elec. Mfg. ..	35	12½*	57/6	—	4 6 10
Murex	20	10*	53/-	+6d	3 15 6
Newman Ind. (2/-)	17½	10	3/3	—	6 3 1
Oldham & Son (1/-)	60	30*	5/-	—	6 0 0
Parsons C. A. ..	12½	15	80/-	+½	3 15 0
Plessey (5/-) ..	20	20	18/9	+⅛	5 6 8
Pye Deferred (5/-)	25	35	21/3	+1/6	4 2 6
Radio & Tel. (2/-)	—	—	10½d	+1½d	Nil
Revo (10/-) ..	27½	27½	43/3	—	6 7 6
Reyrolle	12½	15	76/3	—	3 18 9
Scophony Baird(1/-)	—	—	1/6	−3d	Nil
Scot. Cable (4/-) ..	30	30	23/6	+6d	5 2 2
Siemens Ord. ..	7½	7½	36/3	+⅛	4 2 9
Switchgear&Cowans (5/-)	20	20	16/3	+⅛	6 3 1
T.C.C. (10/-) ..	15	15	34/6	+2/-	4 7 0
T.C. & M. ..	10	9*	42/6	—	4 4 5
Telephone Mfg.(5/-)	9	10	10/3	—	4 17 7
Thorn Elec. (5/-)..	20	20	18/9xr	—	5 6 8
Tube Investments	25	25	6¾	—	3 18 7
Vactric (5/-) ..	Nil	Nil	10/-	—	—
Veritys (5/-) ..	5	2½	1/-	+6d	3 2 6
Walsall Conduits (4/-)	70	70	56/3	—	4 19 6
Ward & Goldstone (5/-)	50	44*	37/6	—	5 6 8‡
Watford (2/-) ..	20	20	7/-	—	5 14 3
Westinghouse Brake	14	14	61/3	—	4 11 4
West, Allen (5/-)..	10	10*	11/6	+1/-	4 7 0
Transport and Communications					
Anglo-Am. Tel.: Pref.	5⅛	5⅛	87½	+½	6 12 9
Def.	—	—	17	+1	Nil
Anglo-Portuguese	8	8	25/-	—	6 8 0
Brit. Elec. Traction: Def. Ord. ..	50	32½*	525	+10	4 7 5‡
Cable & Wireless: Ord.	4	7	112½	+15	5 6 8
4% Loan ..	4	6	100	−1	4 0 0
Calcutta Trams ..	6†	6†	28/6	−1/6	—
Cape Elec. Trams	6	4	15/-	—	—
Globe Tel. & Tel. Ord.	—	—	22/6	+6d	—
Great Northern Tel. (£10)	7	7½	13	+1½	5 15 5
Inter. Tel. & Tel.	Nil	15 cts	32	+½	—
Marconi Marine ..	7½	10	32/6	+7/6	6 3 0
Oriental Tel. Ord.	16	16	40/-	—	8 0 0
Telephone Props.	6	7	24/6	−6d	5 14 3
Tele. Rentals (5/-)	10	10	11/-	+6d	4 11 0

* After capital bonus.
† Dividends are paid free of Income Tax.
‡ Yield adjusted to capital bonus issue.

NEW PATENTS

Electrical Specifications Recently Published

The numbers under which the specifications will be printed and abridged are given in parentheses. Copies of any specification (2s each) may be obtained from the Patent Office, 25, Southampton Buildings, London, W.C.2.

1946

8123. Naamlooze Vennootschap Philips' Gloeilampenfabrieken.—Current-regulating tubes. 19th March, 1946. (651831.)

20630. Sangamo Weston, Ltd., and Lovegrove, H. J.—Electrical measuring and control apparatus. 29th August, 1947. (651775.)

1947

2537. Telefonaktiebolaget L. M. Ericsson.—Automatic telephone exchanges. 8th April, 1947. (651835.)

11708. Compagnie Générale d'Electricité.—Regulating apparatus for the automatic charging of an accumulator battery in two stages. 3rd June, 1947. (651837.)

16145. El-Said, M. A. H.—Valve mixer circuits. 18th June, 1947. (651838.)

16779. Standard Telephones & Cables, Ltd., and Leno, J. A.—Electrical connections and circuits and their manufacture. 25th June, 1948. (651780.)

17201. Sperry Gyroscope Co., Inc.—Radio direction-finding apparatus. 30th June, 1947. (651839.)

20095. Sperry Gyroscope Co., Inc.—Deflection of a cathode-ray beam in synchronism with a scanned beam of radiant energy. 25th July, 1947. (651844.)

20781. General Motors Corporation.—Coil winding machine. 31st July, 1947. (651968.)

21234. Metals & Controls Corporation.—Snap-acting thermostatic elements. 5th August, 1947. (651845.)

22051. British Thomson-Houston Co., Ltd.—Directive radio systems. 8th August, 1947. (651846.)

22375. Standard Telephones & Cables, Ltd.—Pulse telecommunication system. 12th August, 1947. (651781.)

23478. Finch Telecommunications, Inc.—Facsimile recording system. 25th August, 1947. (651782.)

23479. Finch Telecommunications, Inc.—Colour facsimile receiver. 25th August, 1947. (651783.)

25065. Standard Telephones & Cables, Ltd., and Leno, J. A.—Electrical wiring. 10th September, 1948. (651785.)

26836. Bendix Aviation Corporation.—Automatic regulator for an electrical generator. 6th October, 1947. (651723.)

30113. English Electric Co., Ltd., and Hackworthy, H. G.—Method of preparing flanged tubular insulation for transformer and like windings. 9th November, 1948. (651788.)

30960. Metropolitan-Vickers Electrical Co., Ltd., and Mulligan, J. W.—Alternating current synchronous electric motor control systems. 22nd November, 1948. (651726.)

33139. General Electric Co., Ltd., and Robson, R.—Rotary tipplers for railway waggons. 7th December, 1948. (651859.)

34184. Quervain, A. de.—Cathode-ray tubes. 24th December, 1947. (651728.)

1948

1169. British Thomson-Houston Co., Ltd., and Pollock, A. A.—Commutators for dynamo-electric machines. 25th October, 1948. (651796.)

1290. Plessey Co., Ltd.—Thermo-responsive electric control device. 15th January, 1948. (651731.)

1633. English Electric Co., Ltd., Woodford, C. G. A., Wilkinson, H., and Smith, R. V.—Electrical actuators for aircraft. 7th January, 1949. (651798.)

2141. British Thomson-Houston Co., Ltd.—Electrically heated blankets. 23rd January, 1948. (651733.)

2991. Naamlooze Vennootschap Philips' Gloeilampenfabrieken.—Circuit arrangements for generating a number of adjacent carrier waves. 2nd February, 1948. (651803.)

4033. Metropolitan-Vickers Electrical Co., Ltd.—Target electrodes for X-ray devices. 11th February, 1948. (651979.)

4040. British Thomson-Houston Co., Ltd., and Petch, jun., T. H.—Depth indicators for mine cages and the like. 18th November, 1948. (651737.)

5068. Brevets et Procedes Pyror Soc. Anon.—Thermostatic regulators for electric heating elements. 20th February, 1948. (651740.)

5092. Western Electric Co., Inc.—Space discharge devices such as photo-electric cells. 20th February, 1948. (651741.)

5271. Flader, Inc., F.—Method of and apparatus for discharging electricity. 23rd February, 1948. (651742.)

5272. Flader, Inc., F.—Apparatus for discharging electricity. 23rd February, 1948. (Addition to 651742.) (651743.)

6144. Ellis, C. E.—Polyphase alternating current dynamo-electric machines. 27th February, 1948. (651750.)

6396. Schreyer, E. P.—Electric steam iron. 1st March, 1948. (651986.)

6764. Jenkins, G. M. O.—Electric combination switch devices. 4th April, 1949. (651987.)

6861. Philips Electrical, Ltd.—Multiplex transmission arrangements for pulse-phase modulation transmission. 5th March, 1948. (651753.)

6948. Schick, W.—Electric capacitors. 5th March, 1949. (651988.)

7938. Pemberton, M. E.—Cathode-ray tube scanning-circuits. 16th March, 1949. (651755.)

9678. Dutton, G. F.—Electro-magnetic pick-ups. 2nd April, 1949. (651757.)

10085. Compagnie Industrielle des Telephones.—Carrier current signalling systems. 12th April, 1948. (651992.)

10101. Siemens Bros. & Co., Ltd., and Hards, E. J.—Electric selector switches. 8th April, 1949. (651807.)

11250. Metropolitan-Vickers Electrical Co., Ltd., and Ludlow, J. H.—Arrangements for cooling electric discharge tubes. 24th January, 1949. (651994.)

12175. Sharp, W.—Thermally-tripped electric switches. 25th February, 1949. (651883.)

12541. Lovett, F. E.—Coin-freed electrically operated hair dryers. 6th May, 1949. (651885.)

13167. Westinghouse Electric International Co.—Regulating systems for alternating current systems. 13th May, 1948. (651888.)

14688. Czechoslovak Metal & Engineering Works, National Corporation, and Houst, F.—Arc-rupturing arrangements in electric circuit-breakers. 31st May, 1948. (651911.)

15823. General Electric Co., Ltd., and Earp, W. A.—Electrical saw-tooth voltage oscillation generators. 23rd May, 1949. (651810.)

16865. Westinghouse Electric International Co.—Protective relaying systems. 23rd June, 1948. (651998.)

16892. Metropolitan-Vickers Electrical Co., Ltd. (General Electric Co.).—Electronic counters. 23rd June, 1948. (651889.)

18543. Telefonaktiebolaget L. M. Ericsson.—Contact spring sets for electro-magnetic relays and similar switching apparatus. 9th July, 1948. (651923.)

18958. Rely-a-Bell Burglar & Fire Alarm Co., Ltd., and Moxley, L. J.—Electric burglar alarm systems. 28th March, 1949. (651811.)

19123. Grein, P. F. A.—Electric permanent hair-waving appliances. 3rd September, 1948. (651924.)

22406. General Electric Co., Ltd., and Clack, B. N.—Electric discharge devices comprising a rare gas filling within a sealed envelope. 25th August, 1949. (652013.)

22730. Birlec, Ltd.—Induction furnaces. 28th August, 1948. (652014.)

23227. Johnson, W. A.—Aerial systems. 29th August, 1949. (651812.)

24074. Pirelli-General Cable Works, Ltd.—Jointing of oil-filled electric cables. 14th September, 1948. (651939.)

25517. General Electric Co., Ltd., and Bloch, A.—Radio aerial systems. 28th September, 1949. (651940.)

25954. Abbott Machine Co.—Electrical driving arrangements for the bobbins of textile spinning and twisting frames. 5th October, 1948. (652016.)

27264. Mullard Radio Valve Co., Ltd., and Braybrook, C. H.—Circuit arrangements for converting electric currents. 20th October, 1948. (651943.)

27356. Philips Electrical, Ltd.—Circuit arrangements for producing high-frequency oscillations. 21st October, 1948. (651945.)

27638. Mieremet, J. G.—Apparatus for equalizing electric potentials at adjacent points on the earth's surface. 25th October, 1948. (651946.)

28846. Siemens Bros., & Co., Ltd., Gee, F. J., and Ford, W. J.—Electric multiplying cables. 5th November, 1948. (651950.)

29181. Nemec, H.—Electro-medical apparatus. 10th November, 1948. (651951.)

30265. Cinema-Television, Ltd., and McConnell, E. D.—Synchronized time bases for television and like systems. 20th October, 1949. (652023.)

31144. British Thomson-Houston Co., Ltd., and Bocock, W. A.—Electromagnetic pick-ups. 25th October, 1949. (652026.)

32974. Metropolitan-Vickers Electrical Co., Ltd.—Contact mechanism for supplying current to electric arc-welding electrodes fed through the mechanism. 21st December, 1948. (651959.)

1950

7506. Power Jets (Research & Development), Ltd., and Smith, A. G.—Blading for turbine and like machines. 9th October, 1948. (Divided out of 651787.) (651830.)

20545. Siemens Bros. & Co., Ltd., Gee, F. J., and Ford, W. J.—Electric multiplying cables. 5th November, 1948. (Divided out of 651950.) (651960.)

Amended Specification

579860. Standard Telephones & Cables, Ltd. (International Standard Electric Corporation).—Electric pulse modulation signalling systems.

TRADE MARKS

APPLICATIONS have been made for the registration of the following trade marks. Objections may be entered within a month from the dates stated :—

14th February

ELECTRO-FUNDITOR. No. B688,010, Class 9. Apparatus for automatically controlling the temperature of electrically operated metal pot heaters used in linotype, intertype and monotype machines.—Funditor, Ltd., Woodbridge House, 3, Woodbridge Street, Clerkenwell Green, London, E.C.1.

ALDWAYS and ALDWAS. Nos. 691,740 and 691,742 respectively, Class 9. Electrical resistances, condensers, interference suppressors, current limiters, safety fuses, switches, circuit breakers, transformers, potentiometers, inductances, chokes, thermionic valves and thermionic valve holders, terminals, contactors, connectors, insulated electric wire and fuse wire, electrostatic screening apparatus, filtering apparatus, junction boxes, apparatus and instruments for reproducing sound or pictures, loudspeakers; apparatus for amplifying wireless telegraphy, television, telephony, sound and radar signals; electric discharge lamps, photo-electric cells, instruments for measuring and indicating weak voltages and weak current, high frequency electrical apparatus included in Class 9, telecommunication apparatus; and parts and fittings included in Class 9 of all the aforesaid goods.—Tesla, Národní Podnik, Praha II, Czechoslovakia. Address for service: c/o Reddie & Grose, 6, Bream's Buildings, London, E.C.4.

CONYBOND and CONAMBOND. Nos. 694,172–3 respectively, Class 9. Insulated electric wires and cables.—Connollys (Blackley), Ltd., Blackley Vale Mills, Blackley, Manchester.

VIGILUX. No. 694,408, Class 10. Electrically heated blankets.—Warm-glow Co., Ltd., 1133, London Road, Leigh-on-Sea.

CUBICOLD. No. B694,609, Class 11. Installations for refrigerating purposes.—Whades (Sussex), Ltd., Duke Street, Littlehampton.

Design. No. 693,101, Class 11. Electrical installations for lighting, heating, cooking, refrigerating and ventilating. —John Croal, 54, Broughton Street, Edinburgh, 1.

21st February

HELICON. No. 684,378. Class 9. Wireless valves.—Helikon, Ltd., 234, Bishopsgate, London, E.C.2.

KADA. No. B690,701, Class 9. Magnets and electric relays, all for use with electronic and pipe organs.—Alfred E. Davies & Son, Ltd., Organ Works, Campbell Square, Northampton.

BESCO. No. 691,929, Class 9. Domestic radio and television apparatus.—Building Electrical Service Co., Ltd., 27, Station Road, Harrow.

EMICORDER. No. 694,533, Class 9. Apparatus, instruments and devices for the recording of sound.—Electric & Musical Industries, Ltd., Blyth Road, Hayes, Middlesex.

ALITE (design). No. B670,777, Class 11. Electric lamp bulbs for motor vehicles.—Associated Lighting, Ltd., Lowerhouse Mills, West Bollington, Macclesfield.

Housecraft Examinations

THE E.A.W. Certificate Examination for Teachers was held on 16th December, 1950, when 59 candidates qualified for the certificate, five gaining distinction. Examination centres were held, through the courtesy of the respective Area Boards, at Cambridge and Liverpool; by courtesy of the principals, at the Domestic Science Colleges, Aberdeen, Edinburgh and Glasgow; and at E.A.W. headquarters. The total number of certificate holders is now 1,609.

The E.A.W. Certificate Examination in Electrical Housecraft for Demonstrators and Saleswomen was held on 14th December, 1950, when 53 candidates qualified for the certificate, eight gaining distinction. Examination centres were held, through the courtesy of the respective Area Boards, at Cambridge, Cleethorpes, Liverpool, Maidstone and Wood Green; by courtesy of the principals at the Domestic Science Colleges, Aberdeen, Bath and Glasgow, and at Brighton and Salford Technical Colleges; at the E.L.M.A. Lighting Service Bureau and E.A.W. headquarters. The total number of certificate holders is now 1,644.

CONTRACT INFORMATION

Accepted Tenders and Prospective Electrical Work

CONTRACTS OPEN

Where "Contracts Open" are advertised in our "Official Notices" section, the date of the issue is given in parentheses.

Australia.—BRISBANE.—6th April. Supply of 1,500 yd. of 0.50 sq. in. single-core, 11,000 V., paper-insulated, lead-covered cable. (C.R.E. (I.B.) 53525/51. Ten/2168.)*

Bradford.—24th March. Dismantling and removal of redundant switchgear and wiring and supply and installation of new switchgear and wiring at Dumb Mills, Frizinghall. (See 23rd February issue.)

Chester.—Corporation. Electrical contractors wishing to tender for the electrical installation and wiring of two stream infants' school, Blacon, should submit their names by 9th March. (See this issue.)

Coventry.—9th April. Education Committee. Electrical installation in Parkgate Road Primary School. (See this issue.)

Cuckfield.—22nd March. R.D.C. Installation of electricity in Council houses. (See this issue.)

Devizes.—13th March. Corporation. Street lighting equipment. (See 23rd February issue.)

Isle of Ely.—19th March. County Council. Electrical installation in proposed junior and infants' school, Wisbech. (See 23rd February issue.)

Leeds.—8th March. Waterworks Department. One 320 b.h.p. horizontal slip ring, protected, induction type motor. (See this issue.)

New Zealand.—WELLINGTON.—8th May. State Hydro-Electric Department. One 80-ton electric overhead travelling crane. (C.R.E. (I.B.) 54261/51. Ten/2169.)*

Uruguay. — MONTEVIDEO. — 11th April. Administracion General de las Usinas Electricas y los Telefonos del Estado. Substation equipment. (C.R.E. (I.B.) 54078/51. Ten/2171.)*

Wiltshire.—County Education Committee. Applications to tender for the electrical installation at the N.W. Wilts Area College for Further Education, at Chippenham, should be submitted by 7th March. (See this issue.)

ORDERS PLACED

Bradford.—Corporation Markets and Fairs Committee. Rewiring electrical installation at the Market Tavern (£275).—J. Wilkinson & Son (Greengates), Ltd.

Liverpool.—Regional Hospital Board. Electrical work at twin operating theatres, Broadgreen Hospital (£2,188).—Grierson, Ltd.

Newcastle-on-Tyne. — Regional Hospital Board. Underground cable for Newcastle General Hospital, cable work for X-ray equipment at South Shields General Hospital, and the reorganization of the electrical services at Shotley Bridge Hospital.—Crompton Parkinson and Co. Electric power supplies at Wooley Sanatorium.—North Eastern Electricity Board.

Northern Ireland.—Contracts have been placed with Siemens Electric Lamps & Supplies, Ltd., for ninety-five "Sieray" fluorescent lanterns for the relighting of Newry, and for the supply and erection of fifty-two fluorescent units on Rooney's Meadow Housing Trust Estate, Newry.

Torquay.—Corporation. Electrical installations in 94 houses on the Marldon Road housing estate (£3,326).—Yeldon & Gardiner (revised tender).

CONTRACTS IN PROSPECT

Particulars of new works and building schemes for the use of electrical installation contractors and traders. Publication in this section is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Aberdare.—College of further education; Gollins, Melvin & Partners, architects, 21, Russell Square, W.C.1.

Beyton (Bury St. Edmunds).—Secondary modern school (£131,104) for West Suffolk E.C.; H Greengrass & Sons, builders, 56, Pitt Street, Norwich.

Birkenhead.—Technical college, Borough Road; Willink & Dodd, architects to T.C., Cunard Buildings, Liverpool, 3.

Blackpool.—Industrial premises, Mowbray Drive; Middleton & Co. (Blackpool), Ltd., Bank Street Sidings.

Houses (21), Mereside estate; Simmons Bros., 71, Lancaster Road, Maston.

Bournemouth.—Houses (40), Leybourne estate; borough engineer.

Brighton.—School, Saltdean (£20,000); education officer, Marlborough House, Old Steine, Brighton, 1.

Bristol.—Premises at Brislington Trading Estate; Oxo, Ltd., Thames House, Queen Street Place, E.C.4.

Houses (460), Henbury estate; John Laing & Son, Ltd., Bunns Lane, N.W.7.

Chesterfield.—Additional factory buildings; Robertson & Woodcock, Ltd., Treber Works, Brimington Road.

*Specifications may be inspected at the Commercial Relations and Exports Department, Board of Trade, Thames House North, Millbank, S.W.1 (Victoria 9040).

Chichester.—Factory extensions; National Printing Ink Co., Ltd., Terminus Road.

Cirencester.—Pathological laboratory at Memorial Hospital; Pyle & Saint, Thomas Street House.

Coventry.—Baths, communal laundry, etc.; D. E. E. Gibson, city architect, 1a, Warwick Row.

Deal.—Houses and flats (60), Orchard Avenue; borough surveyor, Municipal Offices, Queen St.

Derby.—Infants' school, Brackens Lane, Allenton; Vic Hallam, Ltd., Valley Works, Langley Mill.

Durham.—Houses on 38-acre site at Low Carr House Farm; city engineer, Town Hall.

Eccles.—Flats (24), Ellesmere Park; Geo. Wimpey & Co., Ltd.

Falmouth.—Technical institute (£136,000); S. Gregson, Cornwall county architect, County Hall, Truro.

Fareham.—Abattoir for Ministry of Food; Gee, Walker & Slater, Ltd., builders, 100, Park Lane, W.1.

Gorseinon.—College of further education; Glamorgan county architect, Cardiff.

Haltwhistle (Northumberland).—Houses (54) at Halton-lea-Gate; R.D.C. surveyor.

Herne Bay.—Secondary mixed school (£134,640); Kent county architect, Springfield, Maidstone.

Kettering.—Three-storey technical institute; county architect, Northampton.

Leamington Spa.—Houses (27), Stud Farm estate; Lewis & Watters, Ltd., Farm Buildings, Lime Avenue.

Leeds.—Erection of Beckett Park Primary School; N. B. Bell & Co., Ltd., Frankland Terrace.

Letchworth.—Houses (50) on two sites at Eastern Way; U.D.C. surveyor, The Broadway.

Lichfield.—Block of three-storey flats (experimental); city engineer, Guildhall.

Liverpool.—Kitchen, dining hall and lecture hall at C. F. Mott Training College (£42,630); Norwest Construction Co., Liverpool.

Erection of first part of Walton Lane Primary School; Rimmer Bros. (Liverpool), Ltd.

London. — CAMBERWELL. — Dwellings (60), Cleve Hall estate; Howes & Jackman, architects, 1, Verulam Buildings, Gray's Inn, W.C.1.

SOUTHWARK.—Dwellings (106), Nelson Square; borough surveyor.

GREENWICH.—Flats (48), Cherry Orchard site, Charlton; borough engineer, Greenwich High Road, S.E.10.

Manchester.—Extension to factory at Northenden for Leyton Studios, Ltd.; Contractors (Manchester), Ltd., Stockport.

Middleton.—Houses (90), Acresfield Road site; J. Pollard, borough architect, Town Hall.

Northampton.—Houses (92) and a block of garages at Cherry Orchard Farm site; borough architect.

North Riding.—County college, Richmond; D. W. Dickenson, education architect, County Hall, Northallerton.

Ormskirk.—Houses, Scott estate, Ormskirk (40) and Richmond Avenue site, Burscough (24); U.D.C. surveyor.

Reading.—Works extensions; City Motors (Oxford), Ltd., Vastern Avenue.

Rhyl.—County fire station at Kinnear; Flintshire county architect, County Buildings, Mold.

Rochdale.—Houses (207), Kirkholt estate; Wm. Townson & Sons, Ltd., Park Hill St., Bolton.

Rochford.—Housing scheme, Cagefield, Stambridge; R.D.C. surveyor, Council Offices, Rochford, Essex.

St. Helens.—Houses (84), East Lancs Road estate; Hy. Horridge & Co., Ltd., Wargrave Road, Earlstown.

Sale.—Houses (40), Baguley Lane estate No. 3; F. Entwisle & Co., Ltd., Davyhulme, Urmston.

Stockport. — Houses (58), Houldsworth estate; W. Farley & Co., Ltd.

Flats, Brinnington neighbourhood unit: 45 in three blocks; G. Bullimore, architect, Stockport. 30 in two blocks; Cruikshank & Seward, 16, Princess Street, Manchester.

Stockton-on-Tees. — Swimming baths, North End Recreation Ground (£65,000); borough architect, 28, The Square.

Restaurant, Ropner Park; borough architect.

Stoke-on-Trent.—Erection of Lyme Road C.P. School (£55,786); C. Cornes & Sons, Ltd., Lichfield Street, Hanley.

Sunderland.—Five shops and flats, Hylton Road, for the T.C. (£18,725); G. H. Plemper, Ltd., builders, Old Chester Road.

Swindon.—Factory, industrial estate; Wessex Guild, Ltd., Morley Street.

Taunton.—Houses (100), Bridgwater Road estate; borough housing architect, 2, Baldwin Rd.

Thurrock.—Houses (134), and shops with maisonnettes over, Corringham (Shell housing contract), for U.D.C.; surveyor, Council Offices, Palmers Avenue, Grays, Essex.

Wallingford.—Flats (78), Newlands site, Didcot, for R.D.C.; Beecher & Stamford, architects, 14, Park End Street, Oxford.

Wallsend.—Houses (110), Low Willington; J. H. James, builder, Archer Street.

Walsall.—Factory, Alumwell Road; Jetal Finishes (England), Ltd., 14, Frederick Street, Birmingham.

Conversion of Savoy Cinema into civic theatre (£29,000); M. E. Habershon, borough surveyor, The Council House.

Wigan.—Houses (230) in 1951, eight shops and 24 flats; borough engineer.

Woking.—Houses (40), Maybury estate, for Urban District Council; H. P. Tame, surveyor, Council Offices.

Worcestershire.—Birchen Coppice C.P. School, Kidderminster; A. H. Guest, Ltd., Coalbourne Brook, Stourbridge.

Worthing.—Dwellings (102), Ivydore Avenue site; borough surveyor.

Reconstruction after fire, 14-20, South Street; Hubbards, Ltd.